IRON AGE

Vol. 161, No. 16 April 15, 1948

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RYERSON STEEL

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Appeasement At Home

THERE are many things in this country that puzzle Joe and his pals in the Kremlin. One is certainly the bland impunity with which scribes and the opposition regularly lay the President over a barrel. The spanking which our leader takes would be fatal in Russia to those who thus profane the dignity of the Chief.

But a matter for even greater wonderment is the manner in which John L. frequently and impudently humbles the occupant of the White House. F.D.R. in time of war was excoriated by the mine leader because he refused at times to subordinate the national interest to the personal interest of John. Truman today is getting the same treatment. While exhorting the nation to resist Joe, Harry meekly knuckles down to John.

No country is more sensitive to monopoly and its menace to the common good than the United States. The Sherman Act, the Clayton Act and innumerable decisions of the Supreme Court assert and define the paramount power of the central government whereever monopolies raise their ugly heads - that is, everywhere except in the field of labor.

Starting with the La Guardia Anti-Injunction Act and reaching its crest of permissive license in the Wagner Act, labor has been a privileged party under the law. It could intimidate the weak, slug the courageous, destroy the plants of independent employers, blockade interstate commerce and tweak the nose of the President. In the field of labor, Anglo-Saxon justice was a travesty.

Most serious of all its extra-legal privileges was the right to establish complete monopolies in industry after industry and to supplement paralyzing strikes with every conceivable form of violence.

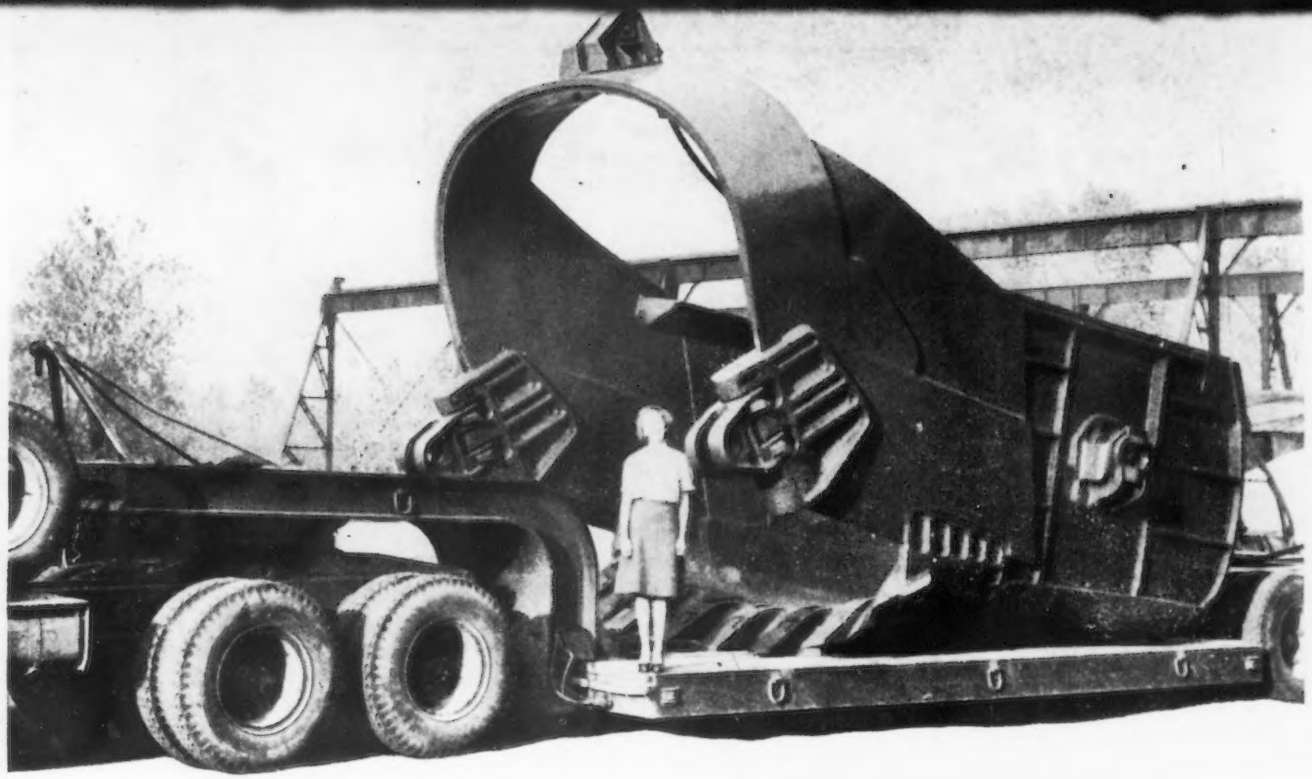
The Taft-Hartley Act is a tardy effort to correct this situation. Its sanctions are definitely of the powder puff variety. Its restraint and extreme solicitude for labor did not shield its authors from the venom of professional unioneers. If the latter had had their way, every legislator who voted for the act would have been purged from public life.

The stoppage in coal is a "national emergency" within the meaning of the Taft-Hartley Act and is covered specifically by Sections 206-210. It empowers the President to appoint a Board of Inquiry to determine the facts. Upon receipt of this report he may instruct the Attorney General to get a sixty-day injunction. At the expiration of this period, the procedures under the Act allow for another twenty-day delay.

Here is a union controlling more than 90% of all the miners. Approximately two-thirds of all the energy needed to run our country comes from coal. We are approaching an international crisis that carries the tragic possibility of war. Our ability to meet it depends upon ample supplies of coal. Yet here is an insolent and contumacious labor boss who has so far succeeded by weasel language in circumventing the law, attempting to extract further particular and personal advantage from the nations distress.

Appeasement of John is as futile and dangerous as appeasement of Joe. Is it not high time to match the bold front we are presenting to Joe with corresponding firmness and courage in dealing with John?

Joseph Stagg Lawrence



World's Largest Dragline Bucket

. . . made of Inland HI-STEEL for greater resistance to abrasion, lower weight

IMAGINE a scoop that moves 25,000 tons of hardpan and shale . . . *every 24 hours.* That's just what this huge dragline bucket — built for a mid-western coal company by the Page Engineering Company — is doing.

When Page engineers designed this bucket, they faced the problem of finding a metal tough enough to resist extraordinary abrasion . . . yet light enough to handle effectively and economically, at least 30 cubic yards of earth per cycle.

To solve this problem, they chose Inland Hi-Steel. This low-alloy, high-strength steel provided the high resistance to abrasion they needed. Its high strength-to-weight ratio made possible the use of lighter gage sections without impairing strength.

They found that Hi-Steel could be worked as easily as ordinary carbon steel . . . without changing the fabricating equipment in their plant.

It will pay you to investigate Inland Hi-Steel if you have a problem calling for steel with a high strength-to-weight ratio, greater resistance to abrasion or corrosion.

To make more Hi-Steel available, other companies have been licensed to make this superior product. Write for Bulletin No. 11. INLAND STEEL CO., 38 S. Dearborn St., Chicago, Ill.

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Hi-Steel meets the requirements of SAE Specification 950

Available in Many Forms

INLAND HI-STEEL

THE LOW-ALLOY, HI-STRENGTH STEEL

► An office building with stainless steel exterior may be built this year. Negotiations are now going on for the project which would have outside walls of stainless steel sheet. Sections made into a box with stainless sheet on one side and carbon sheet on the other have already been fabricated. These box sections, 4-in. deep and filled with Fiberglass insulation, can be attached to the usual structural steel framework of the building.

► A large chemical company has developed a chemically treated cotton cloth to wipe "fog" off the inside of car windows. The cloth can also be used on "steamed-up" eye glasses.

► The steel industry faces equipment troubles if the defense program blossoms out sooner than expected. Since the end of the war plants have been run as long as possible without major repairs. Equipment is and has been wearing out fast. But some steel firms wonder where the money is coming from to provide replacements.

► Although exports during January, reported at 500,767 net tons, were lower than during the previous month or the same period a year age, the monthly totals will climb sharply during the second quarter of 1948 when exports under the foreign aid program begin moving. A number of procurement contracts are already in the negotiation stage.

► Much of the mystery surrounding the industry-control psychology can be traced right to Washington. Coupled with the talk of broad economic controls, the Administration is exercising a heterogenous bunch of controls, voluntary and otherwise, scattered throughout a half dozen agencies. Also contributing are two defense planning groups and more than a score of industry advisory committees.

► If the coal dispute ends with John L. Lewis getting what he wants, coal costs will be higher for steelmakers. It is expected that Philip Murray will get a moderate increase for his steelworkers. Also, new freight boosts may be forthcoming. All this adds up to higher steel prices--no matter what the politicians say. Steel firms are in business to make money--not for fun or politics.

► The growing popularity of carbide tools is illustrated by the experience of a large Detroit plant producing parts for the auto industry. Three years ago this plant was using carbide tools for less than 25 pct of its production; today, carbide tools are employed for 85 pct of its machining operations.

► New fields and sources for iron ore are interesting. But, based on the tonnages of ore now being used and expected to be consumed over the next few years, it will take a mighty big find to excite ore people. High costs for equipment are keeping U.S. Steel's Eastern plant in the proposal stage. Consumer studies, price trends, basing point outlook and West Coast potential markets, may play the compelling roles in speeding the new plant to reality.

► A serious steel problem experienced by the oil and gas industry is the blistering of tanks, pipes and vessels handling sour crudes, gas and gasoline. Hydrogen sulphide is blamed for a reaction that liberates atomic hydrogen which in turn penetrates the metal, forms molecular hydrogen and produces the blister. Intense research is being conducted in the effort to eliminate the trouble.

► The shutdown of some steel plants because of the coal strike provided an opportunity to do repair work which was overdue. If the damage to some equipment or furnaces caused by closing is too severe, it will offset the good that will come from the repairs made on other equipment which has been run to death--but there is a ghost of a silver lining in whatever repair work is accomplished.

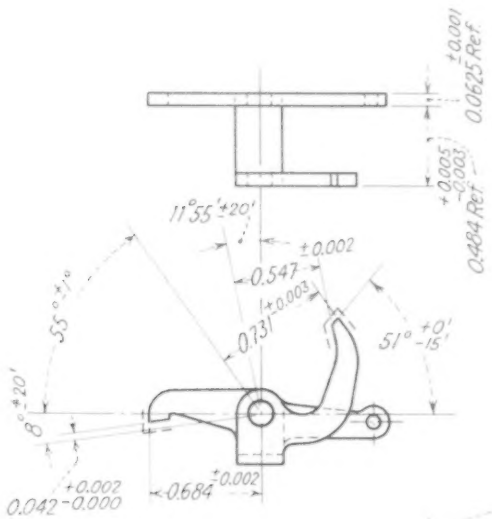
► Tipoff on General Motors' plans for the Kettering high compression engine, was the recent appointment of a superintendent of a new plant to be built, probably at Lansing. A good bet is that the new engine will be available in the 1949 Oldsmobile.

► Measuring surface finish of lapped surfaces has been handicapped by the fact that instruments used frequently marred that finish. A new instrument which does not touch the lapped surface is expected to eliminate this problem and will be marketed shortly.

High Production

Some outstanding work has been done at the Endicott, N. Y., plant of International Business Machines Corp., in broaching small stampings and intricately shaped machine parts. By standardizing fixtures, clamping devices, and locaters, these parts are interchangeable on various machines. Careful planning along with this standardization has resulted in more than a thousand parts being broached regularly. Techniques and some of the specific broaching jobs done at IBM are described in this article.

SURFACE broaching has long been accepted as a means of rapid stock removal for forgings, castings and similar heavy sectioned parts, but in the manufacture of small parts or sheet metal parts, surface broaching likewise has much to offer. Upwards of a thousand such operations are performed regularly at the Endicott, N. Y., plant of International Business Machine Corp., consuming 90,000 to 100,000 man-hr annually.



ABOVE

FIG. 1 - Small parts can be broached on more than one plane, and on several different surfaces with accuracy.

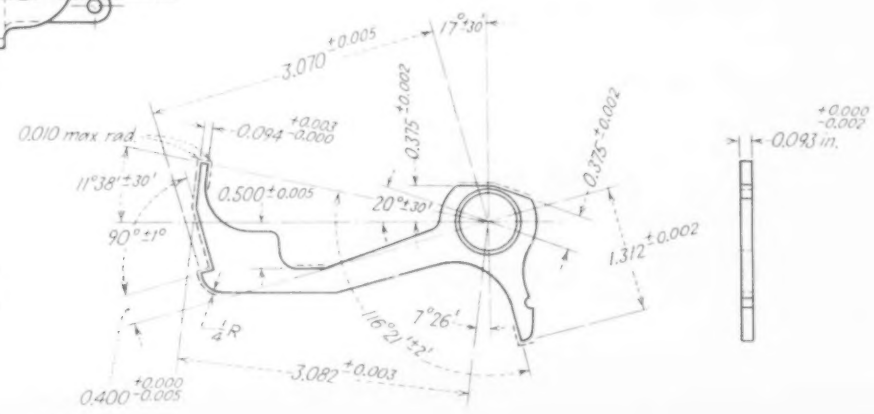
Prior to 1935, IBM surface broached only a few parts which were handled exclusively in fixtures mounted on standard horizontal machines. The success obtained in machining these few parts prompted the addition of vertical broaching machines and the application of broaching wherever feasible.

In planning the machining of small or intricate parts or stampings, where smoothness of finish is important in order to reduce friction and the power required to operate them, broaching can readily be appreciated. The advantages of broaching such parts are several.

After forming, parts can be broached to close accuracy in one operation, often eliminating trimming and shaving operations. Full surfaces can be maintained on the thickness of parts such as latches, dogs, detents or stops, when such is

BELOW

FIG. 2 - While this part is 3.082 in. across, it is broached in one position on several different surfaces, holding to the tolerances shown. Fig. 7 shows the broaching setup for this part, which machines four pieces at a time.



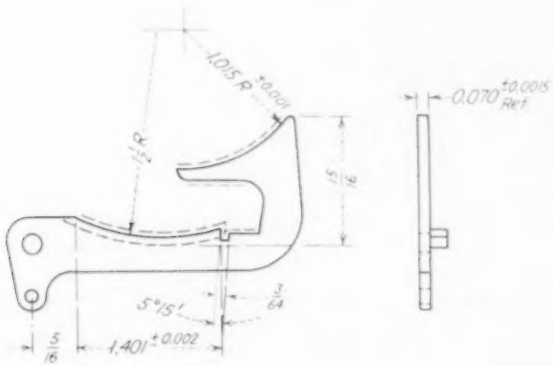
Broaching

a requisite. In the case of guides or working slides, tool marks can be held to a minimum and made to extend in the direction of the sliding action. This tends to add to the smoothness of the action, reducing wear and friction.

Parts can be readily broached on two or more planes, holding to extremely close tolerances, as evidenced in the tolerances shown in figs. 1 and 2. In many instances, the proper application of shear will emliminate the expensive operation of burring. In one operation at the IBM plant, 60° shear was used to eliminate a burring operation on a long thin part.

Straight broaches are relatively easy to make, set up and maintain. It is for this reason that IBM keeps radius broaching to a minimum. While a great deal of radius broaching is necessary and is done, straight cuts are used wherever possible. An example of a typical radius broaching operation is shown in fig. 3.

In laying out broaching setups, a great deal of care should be taken and proper sequence of cuts should be made in order to eliminate burrs and to hold sharp corners where these are desired. Sharp corners can be held true to square as evidenced by the illustration in fig. 4. The correct



ABOVE

FIG. 3 - While radius broaching is avoided at IBM as much as possible, considerable has to be done. Here is part with two radii, a 3/64-in. slot and two flat surfaces that is broached in one operation.

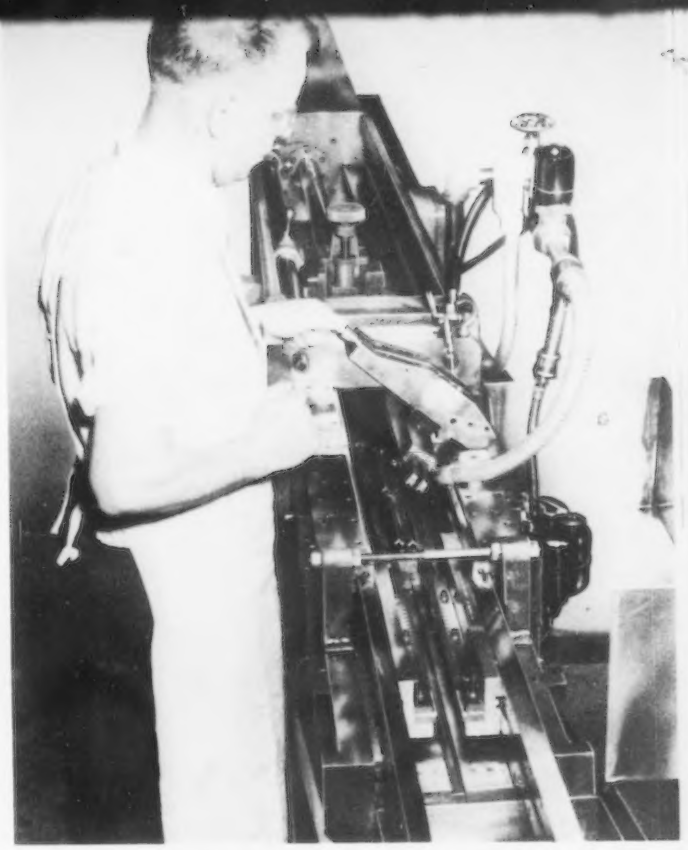
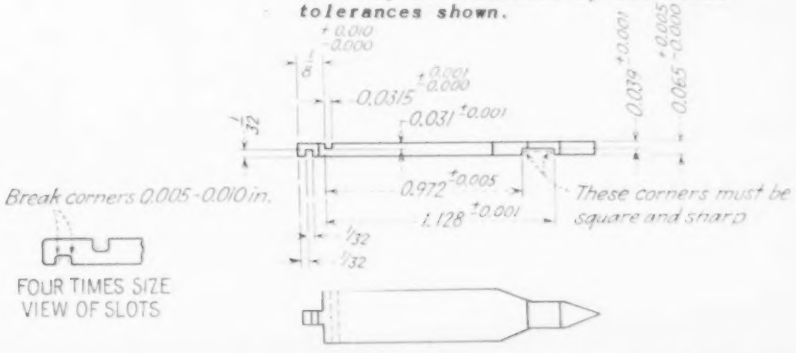


FIG. 5 - The Standard Broaching Fixture developed by IBM, for the horizontal broaching machine, is shown here. The part being broached in this setup is shown in fig. 10.

amount of stock removal per tool tooth should also be considered. Too heavy a cut will overload a broach and often result in tool failure. On the other hand, no cut should be so light that a rubbing action occurs instead of a cutting action. Dragging the broach teeth through a cutting stroke damages the cutting edges of the teeth and the heat of friction will cause galling and tearing of the part surface. On steels and brasses, the cut per tooth varies from 0.0005 to 0.005 in., while on phenolics a cut of 1/32 in. per tooth is not uncommon.

In designing broaching tools and holders, broaching inserts at IBM are held in position

FIG. 4 - This part, about 1¼ in. in overall length, is broached in one operation. To the right is a slot that must be broached sharp and square, while to the left the slots shown have corners broken. Again, part accuracy is evidenced by the close tolerances shown.



o o o

LEFT

FIG. 7 - Standard broaching setups for vertical machines, similar to those used on horizontal machines, were developed by IBM, permitting complete interchangeability of such fixtures on all machines, the length of broaching tool permitting.

o o o

o o o

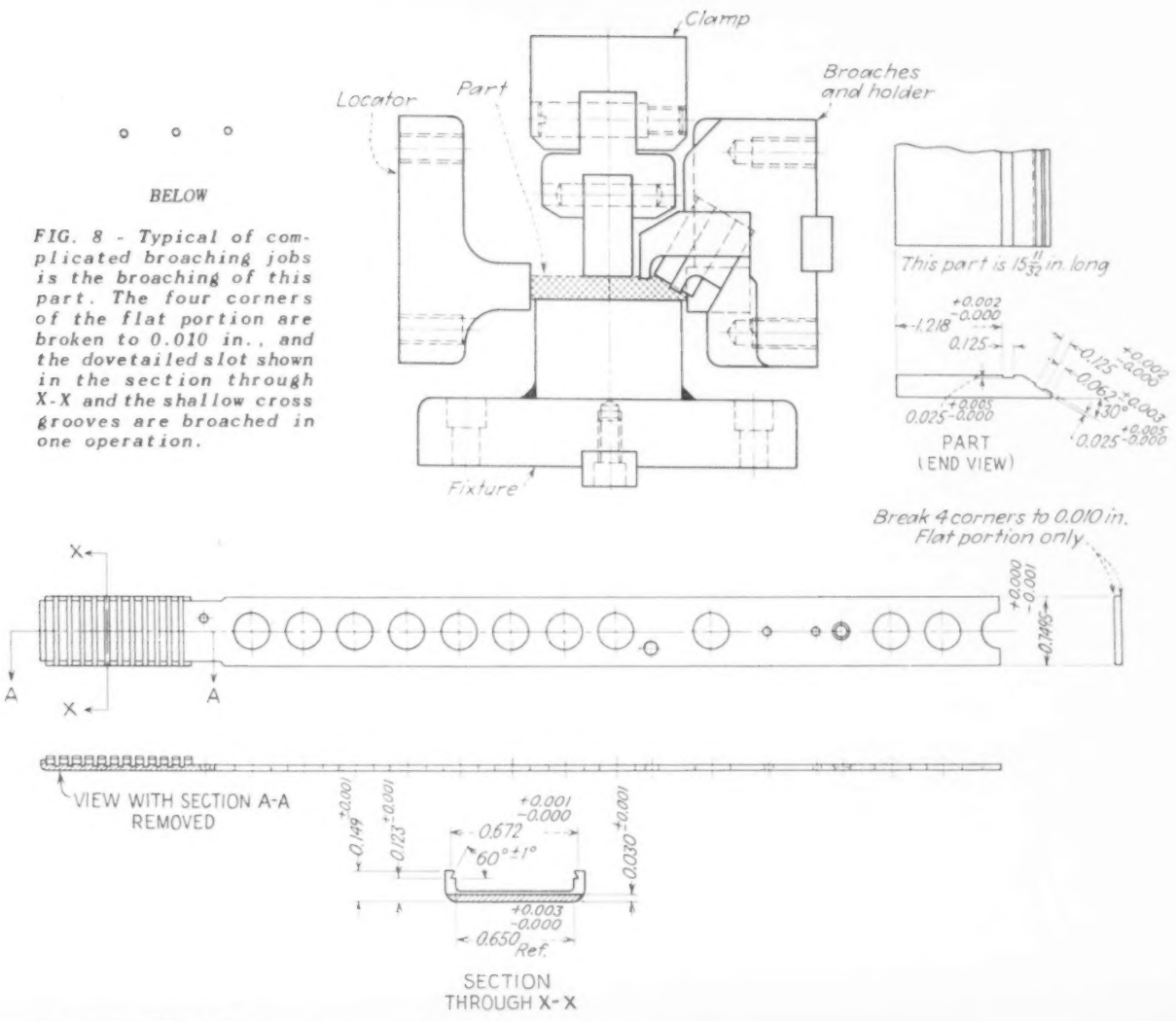
BELOW

FIG. 6 - This is the broaching arrangement on a horizontal machine. The fixture, locator, part, clamp, broach and holder positions are shown. At right is a view of the part shown in the setup.

o o o

BELOW

FIG. 8 - Typical of complicated broaching jobs is the broaching of this part. The four corners of the flat portion are broken to 0.010 in., and the dovetailed slot shown in the section through X-X and the shallow cross grooves are broached in one operation.

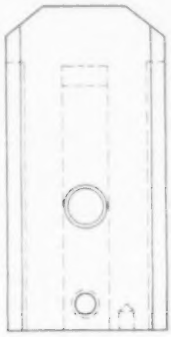


from two directions — downward and from one side — by socket-head screws. The position of these inserts can be adjusted by the use of thin brass shim-stock of thicknesses varying from 0.001 to 0.005 in. Provision is made in laying out the broach inserts at IBM for approximately 1/64-in of shim, eliminating the need for maintaining accurate dimensions in the inserts.

Vertical broach holders are mounted to the machine slides by socket-head screws. While the machines vary in tonnage and stroke, the tapped holes in the slides are uniformly spaced, permitting interchangeability of all jobs on all machines, the length of the broach permitting. Tapped table holes also are uniformly spaced and the keyways are maintained at a given dimension from the slides. Surface broaching is about equally divided as to quantity of work between vertical and horizontal machines.

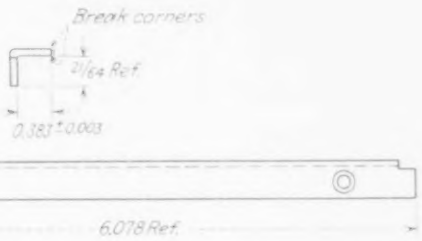
After the original cost of the standard fixture, the individual broaching units are relatively simple, and the advantages of broaching can be applied to parts on which it was previously considered impossible because of high tool costs. To reduce further the costs on small-lot jobs, IBM has developed common clamping units, locaters and adjustable spring locaters. On parallel cuts, tolerances of 0.001 in. are held consistently, and during the war, on Army and Navy instrument work, even closer tolerances were successfully held.

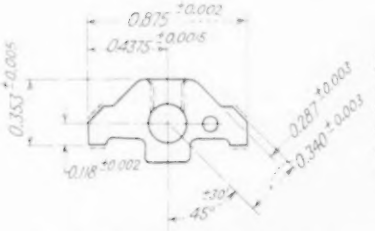
The standard broaching fixture is easily accessible for loading and unloading, and two or more operations can be easily combined into one, as shown in figs. 8 and 9. By being able to combine operations, the cost per part is reduced. At IBM, one year's savings realized by combining several operations on two or three different parts more than paid for equipping the present machines with standard broaching fixtures.



RIGHT

FIG. 10 - This part is loaded four at a time in the horizontal broaching setup shown in fig. 5. The operation is to broach the 0.383 in. diam, and break the corners indicated in the drawing.





LEFT

FIG. 9 - All cuts on this part are made in one operation on a standard horizontal fixture.

Several years ago IBM engineers developed a fixture that is designated at the plant as the *Standard Broaching Fixture*. This fixture is mounted on the head of a horizontal machine, and, in addition to routine broaching, meets the need when broaching long parallel surfaces. It is shown in position on a horizontal broaching machine in fig. 5, and a typical arrangement of the holding fixture, broaching tools, locaters and clamps is shown in fig. 6.

This standard fixture has two parallel slides a fixed distance from the keyway in the bottom of the fixture. Keyways in the slides themselves are a fixed distance from the bottom of the fixture. The slides and the bottom of the fixture are drilled and tapped for mounting holding units, broaches and locaters. Work is clamped by an arm pivoting on the back of the fixture, swinging over the work and locking by means of a cam. The locking dimension for this clamping arm is also pre-established and maintained.

Since there are ten of these standard broaching fixtures in use at all times, the fact that they have been all made uniform makes the broaching tools themselves interchangeable on all machines. Similar standard fixtures have been designed for the vertical broaching machines, as shown in fig. 7.

Some parts typical of the wide variety of those broached at IBM are shown in the various illustrations. The surfaces dimensioned are those broached except those marked reference. This is to indicate stock thickness. In most cases, all surfaces indicated are completed in one stroke of the machine. Fig. 7 is a typical broaching setup for machining the part shown in fig. 2. The broached surfaces of fig. 2 are all broached in one operation, completing four parts per load. Fig. 5 is a typical horizontal broach setup, in which four pieces per load of the parts shown in fig. 10 are machined.

Wherever possible on vertical setups, the parts are stacked in one or two positions, the number in each stack dependent upon the thickness and physical contour of each part. Quick acting cams or toggle clamps are used on all vertical setups. Knockout levers are provided on all fixtures for removing parts quickly and eliminating distortion of frail parts.

Support blocks are made of alloy steels, SAE 3140 or equivalent, and heat-treated to 32 to 35 Rc. This assures long life to the average support block, plus protection to the broach inserts by eliminating the possibility of the inserts coming in contact with a fully hardened surface during operation or when changing broaches. In a few instances, it has been found necessary at IBM to fully harden support blocks to prevent excessive wear when cuts are heavy.

Comparator and dial indicator gages are used to determine the correct setting of broach inserts. The comparator gage is most commonly used because it is quick and accurate, particularly when there are several inserts. Further, the use of setup men is entirely eliminated, as each operator sets up his own job and sees to it that parts are produced within required limits.

ECONOMICAL RINSE

The savings which can be realized through proper rinse tank design and control are frequently neglected in electroplating operations and other processes where rinsing operations are carried out. This article explains the principles of design for both single and multiple tank systems and gives methods for checking and controlling rinsing efficiency. Sample calculations illustrate the procedure for determination of the tank design and water flow most economical for a particular operation.

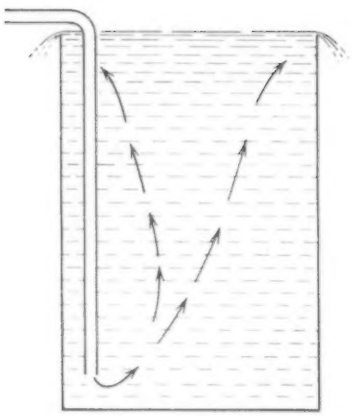


FIG. 1 - Simplest and most popular of all rinse tank designs, well suited to hand operations but likely to be inefficient in water consumption, is shown.

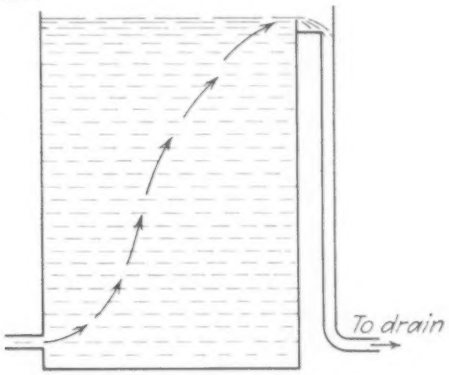


FIG. 2 - This refinement of the general principle of the tank in fig. 1 has a permanent pipe entering the bottom to allow full utilization of the cross-sectional area of the tank.

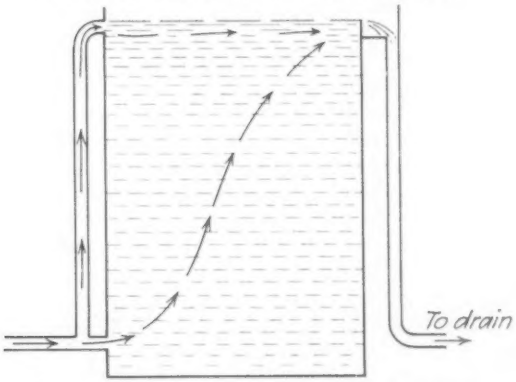


FIG. 3 - The surface sweeping rinse shown is designed to clear the tank of floating material, such as dust and oil, and has the further advantage that rapid surface movement may carry away many of the impurities before they enter the body of the rinse.

MAXIMUM efficiency in rinse tank design and operation is not difficult to achieve, as the principles involved are well understood by plant engineers. Nonetheless the extent of savings possible through proper design and control is often not realized and many installations, such as electroplating lines, using running water rinses of inefficient design are literally pouring dollars down the drain.

When rinsing is faced as an economic problem, a number of tank designs and the amount of water required by each, the cost of the original equipment, possible increases in labor or floor space and other factors must be taken into account.

For establishment of a permanent installation in which original cost and minor floor space considerations can be set aside, economical rinse tank design will depend on the measurement of only two factors: The amount of contaminant retained on the work to be rinsed and hence brought into the tank, and the maximum allowable salt concentration which can be permitted to exist in the rinse tank without harming the pieces or the subsequent processing of them. With this information an engineer need only make a few simple calculations to determine the tank design and water flow best suited and most economical for the particular operation.

To discuss a variety of standard tank designs before taking up methods of selection and control, the most popular design has been found to be a simple running rinse, shown in fig. 1, where water enters the bottom of the tank and overflows at the top. Work is introduced into the tank, which can be improvised from a hose and barrel, and the soluble salts are continuously carried to the drain. This design is good because it is effective and water is cheap, and for many applications, especially hand operations, it is the best answer. However, there are times when such a simple principle uses relatively large amounts of water and it becomes profitable to determine the proper tank design and the min-

TANK DESIGN

By J. B. MOHLER
Research Chemist,
New Castle, Pa.

imum amount of water required to do the job.

An improvement of the same basic design is shown in fig. 2, where the water enters the bottom through a permanent pipe to permit full utilization of the cross-sectional area and passes out of the tank through an overflow which allows a large surface area to move. Variations in this design are profitable if contaminants other than soluble salts are encountered.

Floating material is best taken care of by more effective sweeping of the surface as shown in the tank design in fig. 3 where part of the water is allowed to enter the tank near the top so that the whole surface is swept. In some cases a water spray is actually shot across the top of the tank to achieve the same result and a high water velocity at the surface has the further advantage that it may carry away many of the soluble impurities before they enter the body of the rinse.

Occasionally heavy precipitates or particles of scale are encountered that will not be carried away by an overflow and that may be picked up on the work if allowed to accumulate. Such particles may be carried off by a tank having a drain in the bottom, as in fig. 4, large enough to pass out sinking particles yet small enough for water level maintenance.

All the tanks considered so far have been for a single rinse step and in a great many cases, particularly in hand operations, a single dip and rinse of the work is sufficient.. Where conservation of water is a problem, however, multiple tank systems with two or more tanks in series using the same water should be considered.

A simple series system using the underflow principle, shown in fig. 5, in which a large tank is divided in two by merely placing a wall in the center almost to the bottom has been widely and satisfactorily used. The work is passed through this system counterflow to the water so that it enters tank 2 first and then is finished in the cleaner water of tank 1.

Less water is required in this system than by the use of two separate tanks and the underflow principle keeps tank construction simple. However, if the work entering tank 2 is bulky some of the water will be forced back through the underflow as the work enters so that a larger flow of water will be required to offset this extra source of contamination to tank 1.

This effect can be eliminated by using a double wall, as shown in fig. 6, so that the water enters tank 2 through an overflow which prevents water from backing up into tank 1.

It is obvious that the general principles of design which have been discussed may be extended to more than two tanks and that the

(Continued on page 140)

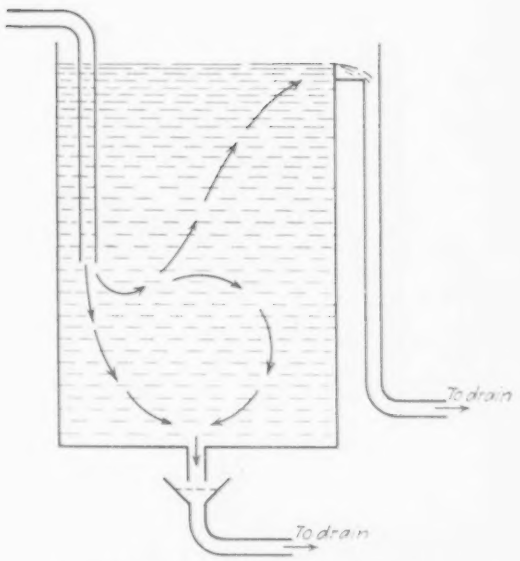


FIG. 4 - To handle precipitates or particles of scale that sink and accumulate on the bottom, a tank similar to the one diagrammed which provides a drain in the bottom large enough to pass out sinking particles yet small enough for water level maintenance can be used.

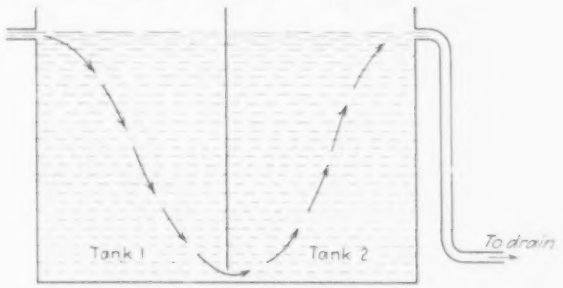


FIG. 5 - For a given rinse efficiency the underflow, series type, rinse tank system shown requires only one tenth the water that a single tank does, but has the drawback of demanding two dips of the work.

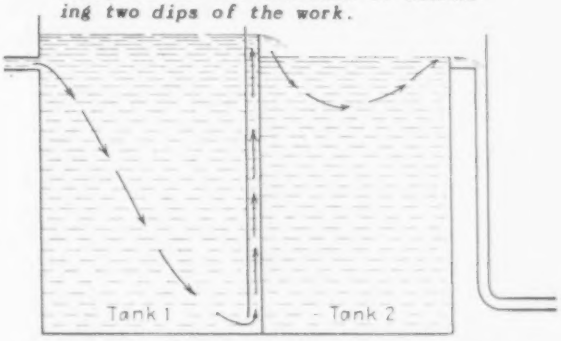


FIG. 6 - This double overflow rinse tank was designed to prevent back-up of contaminated water from tank 2 into tank 1 on the introduction of bulky work.

Kirksite Dies

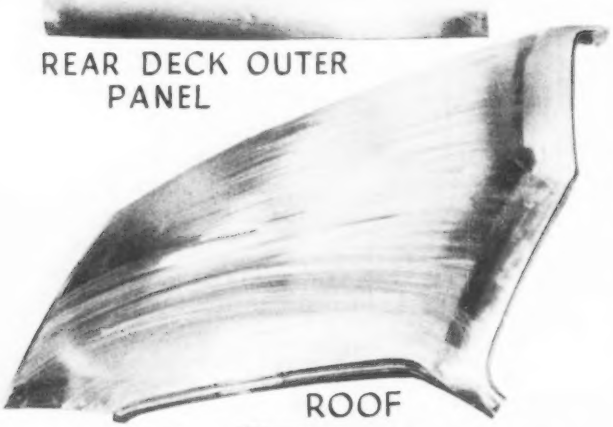


FIG. 1 - Typical of the parts produced with Kirksite dies are these stampings made for the Tucker automobile. Tucker is testing its parts before investing any large amounts in permanent dies.

o o o

By WALTER G. PATTON
Detroit Editor,
THE IRON AGE

o o o

TAKING advantage of wartime experience with Kirksite metal dies used by the aircraft industry and adding its own experience with plaster pattern work, Kirksite foundry technique and die design, Wayne Foundry Co., Detroit, is offering a fast die and stamping service to automobile, commercial truck, bus and trailer coach manufacturers.

Recently, Wayne Foundry produced for the Tucker Corp., Chicago, most of the outer body panels for the 1948 Tucker car. On Nov. 18, 1947 the first models were received at Detroit. By Dec. 30, 50 sets of completely finished outer doors, rear deck inner and outer panels, roofs and hoods were delivered to Chicago.

Tucker has used Kirksite temporary dies to produce pilot models ahead of its permanent tooling which is now reported in process. Using Kirksite dies, Tucker is attempting to prove its die designs before going into production similarly, its welding and assembly fixtures are also being tested in advance of large scale output. If the need should arise, additional production (although at a reduced rate) can be obtained later using these same temporary tools.

Parts made for Tucker by the Wayne Foundry are shown in fig. 1. Some were stamped on Cecostamp presses, while others were stretch formed on Erco stretcher presses. Detail accuracy of the parts is evident ,and sharp corners and bends are clean, as can be observed in the photographs. In addition to Tucker, another newcomer to the automobile industry, the Playboy Corp., Buffalo, has used the Kirksite die technique to produce its pilot models.

Kirksite dies are being used by many manufacturers to test new die designs. Recently one of the big three automobile companies was experiencing difficulty drawing an oil pan. Within 24 hr. a Kirksite die of new design was made available. The new die proved to be satisfactory and a hard die was ordered for large scale production

Aircraft, commercial truck and bus, and the trailer coach manufacturers are typical of those industries using Kirksite dies. By the very nature of their business, long production runs are seldom needed; but in many cases the total production re-

for Auto Stampings

For short run or pilot production of sheet metal parts for automobiles, commercial trucks, buses and trailers, many manufacturers are turning to methods developed by the aircraft industry. The use of Kirksite dies for this work assures quick delivery, economical production, and accurate parts. Methods of production are described in this article.

quired from the die over a period of wears approaches the limit for Kirksite dies. Under the most favorable conditions this may be 50,000 pieces. Other auto producers are using Kirksite dies to make replacement parts for old models; sometimes avoiding expensive die setup charges or even avoiding the reproduction of worn or scrapped dies. It also eliminates die storage.

The life of a Kirksite die can be increased by applying a hard chromium plating to the working surface of the die. The Ductile Chrome Process Co., Detroit, has developed a new chromium plating electrolyte. Several thousand pieces are possible from a Kirksite die plated by this method. The Kirksite die and punch for a bumper guard shown in fig. 2 yielded 200 pieces from 3/32 in. steel. After ductile chrome plating, die life was 2,000 pieces.

In recent years several large industrial plants have carried on extensive investigations using 3-piece Kirksite dies in large hydraulic presses. In at least one instance this technique is being used in the production of short-run parts.

However, in the case of a jobbing foundry which is necessarily more limited in its equipment and must be ready to handle a great variety of jobs, the controlled drop hammer technique has proved satisfactory.

Present facilities at Wayne Foundry include plaster pattern equipment, a completely equipped Kirksite foundry, three Cecostamps, 96 x 48 in., shown in fig. 3, and an Erco stretcher press rated at 300 tons. The company has a staff of three die engineers and specializes in processing of large panels. Other facilities include a 10-ft. press brake, power shears and power hammers.

Several possible combinations of dies and punches are available, depending on the application. A lead punch may be used with a Kirksite female die. This combination is used only for very short runs. A Kirksite die and a Kirksite punch on a Cecostamp is recommended for longer runs. A one-piece Kirksite punch may be used on a stretcher press. The die shape is developed from a power-hammered steel panel which is reinforced and filled with concrete. The steel panel, in this case, is made from a model. This technique is shown in fig. 4. Masonite form blocks may be used on the Cecostamp, using a rubber punch, but is used only for very light materials.

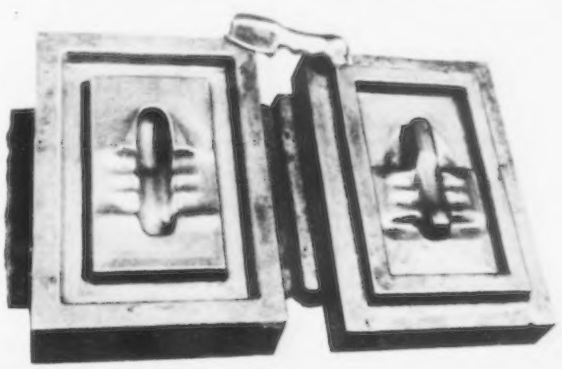
The steps taken to produce the rear deck outer panel of the Tucker car are typical of the process to be followed when a lead punch is used on the Cecostamp. The steel used is 20 gage, SAE 1010, deep drawing quality.

Working from a male model, fig. 5, the first step is to pour a two-piece female plaster model, fig. 6. The two sections, checked carefully for accuracy, are placed together with a spacer to allow for 1/8 shrinkage of the Kirksite. The plaster model is then molded in a steel flask, using an open face sand mold, fig. 7. Kirksite heated to 840°F. is poured into the cavity, as shown in fig. 8.

After pouring, the mold is covered with a heavy insulation board to aid in keeping the temperature uniform and permit solidification free from unnecessary stresses. Cooling of the die requires 7 to 8 hours, after which the die is removed from the sand. The surface is finished and checked, and the female Kirksite die section is ready to be used as the mold surface for the lead punch.

After bringing the surface to a temperature

FIG. 2 - Before chrome plating, this die and punch yielded 200 bumper guards, stamped from 3/32 in. steel. After plating, die and punch life were 2000 pieces.



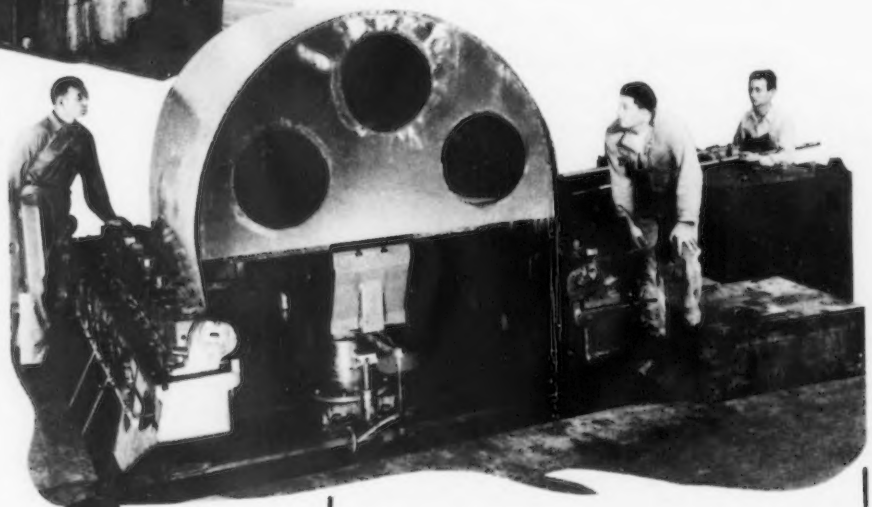
of 250°F. and sprinkling with carbon black, fig. 9, molten lead is poured into the cavity directly on the protected Kirksite die surface. Inserts are then placed in a fixture which is identical with the Cecostamp ram. The punch is then permitted to solidify. After cooling the die is ready for try-out.

The 2-piece die is then placed in the Cecostamp and cleaned up ready for production within 4 hours. Layers of rubber can be used as a draw ring, as shown in fig. 10. After each stroke of the hammer, a layer of rubber was removed until the final stroke was made with no rubber at all.

Both the Cecostamp and the stretcher press are slow production machines, not generally useful for high production. Where thousands of parts are required from a single die, permanent

ABOVE

FIG. 3 - Three 96x48 in. Cecostamp presses make up the press dept. of Wayne Foundry Co.



ABOVE

FIG. 4 - The steel shell die in this 300-ton Erco stretcher press is reinforced with concrete. The part being made is a 60x144 in. aluminum truck roof panel section.

LEFT

FIG. 5 - Production of the die for the Tucker hood begins with an accurate male model.

RIGHT

FIG. 6 - A female plaster cast is poured in two sections from the male model.

dies are usually more economical. However, there are applications where, by using Kirksite dies and completing the flanging or piercing by hand, the field of application of Kirksite has been extended.

An interesting development using Kirksite consists of pouring Kirksite into a plaster cavity mold which is under vacuum. This technique has been used successfully on small molds and work is now being done on molds as large of 5 x 3 ft.

Producers of Kirksite dies recognize definite limitations in the application of soft dies. However, they are convinced that where only low cost tools are justfied—and particularly if the stamped parts are needed in a hurry—Kirksite dies should be given consideration in the production of large metal stampings.

ABOVE

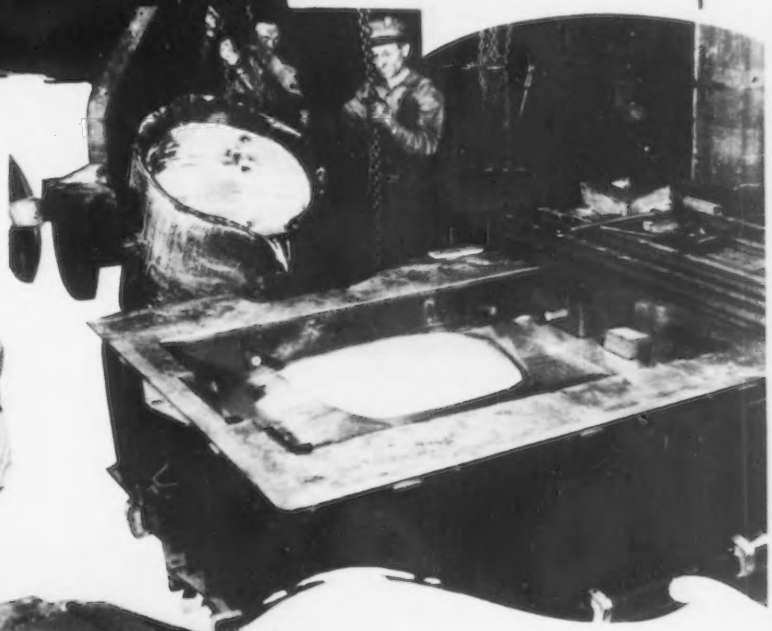
FIG. 10 - The rear deck die is shown in this Cecostamp with the rubber layers used as draw rings. The finished panel is also shown. The rubber layers are removed, one at a time, after each stroke of the press.

BELOW

FIG. 8 - Kirksite is then poured into the female die section mold. The pin core holes around the top of the mold are for the die life.

ABOVE

FIG. 7 - The plaster model is then molded in a steel flask, using an open face sand mold. This is the pattern for the female Kirsite die.



LEFT

FIG. 9 - Carbon black, applied to the heated Kirksite die face before pouring the lead punch, eliminates sticking of the two metals.

Carbide Inserts for Single Point Tools

• • •

The recent development of a new technique in holding carbide cutting tools in single point toolholders has resulted in considerable experimentation. While results are not yet known, certain advantages in the use of such tools are sufficiently evident to justify further examination of this technique.

° ° °

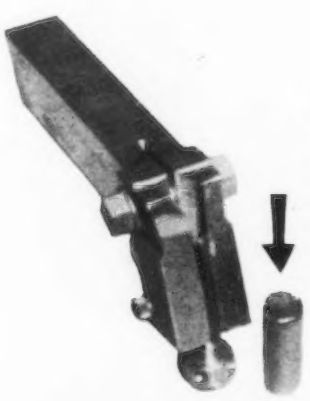
BY THOMAS E. LLOYD
Machinery Editor

° ° °

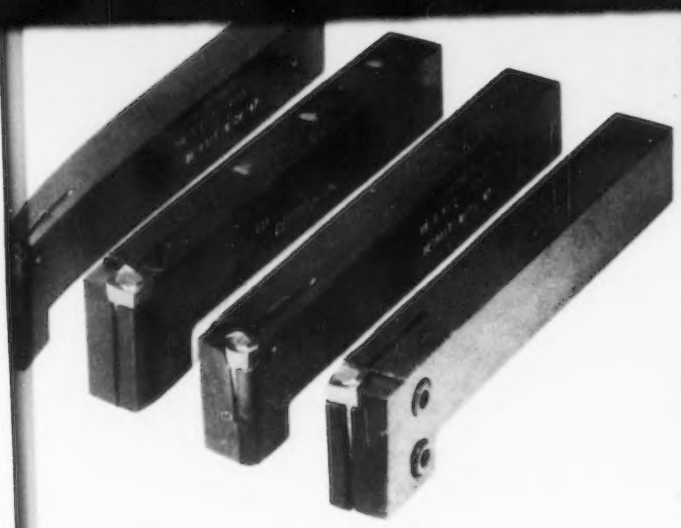
THE simultaneous announcement by several producers of round, square, and triangular shaped carbide inserts, held in specially designed single point tool holders, has resulted in considerable interest in this type of tooling. General Motors Corp., Heald Machine Co., and others are experimenting with this type of cutting tool, and at least a half dozen carbide tool manufacturers have added this type of tool to their line. To date, very little in the way of concrete information on the advantages and disadvantages of these tools has been forthcoming, but the ease of tool insertion into the tool holder, the ability to present a new cutting edge face without grinding the tool, the elimination of the need for certain critical tool angles required by standard carbide tipped tools, the long tool life made possible by length of the insert, and long tool life per grind are among the advantages cited.

General Motors, in turning certain transmission parts, claims that the round carbide inserts will cut up to 12 times as much per grind as standard carbide turning tools, and can be ground up to 12 times as many times as standard tools before being discarded. This claim is about the extent of the information thus far indicated on the life data of the carbide insert tools.

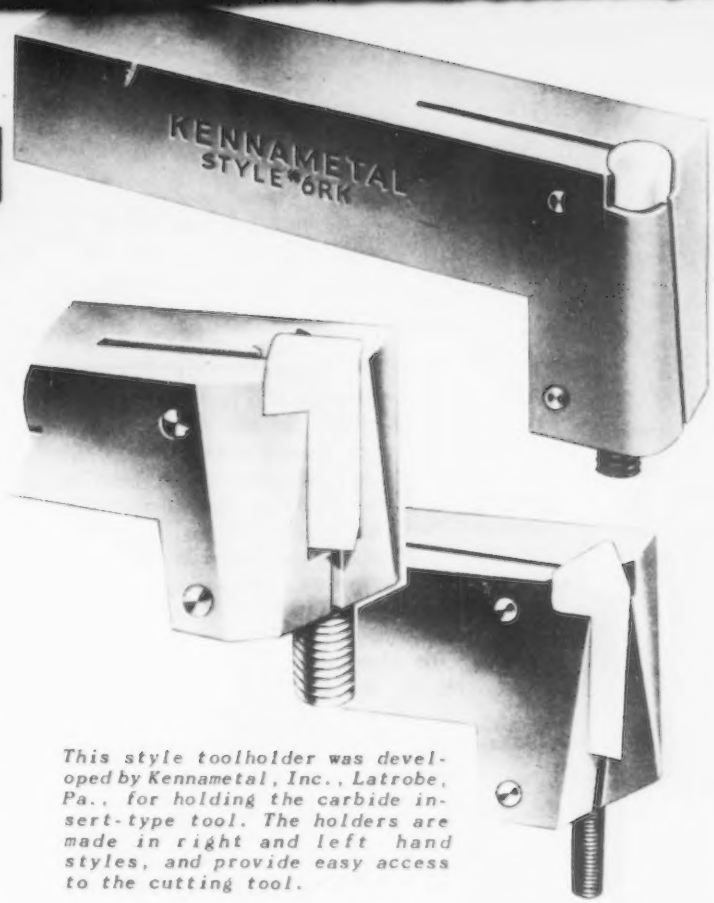
Most experimental work that has been done has been with the round insert ground off flat on the top and anchored securely into position in the tool holder. Heald Machine Co., Worcester, Mass., however, has done some boring work with the round insert floating free in the tool holder. Also, Heald has ground a small shoulder around the circumference of the insert and the cutting edge of the tool presented to the work is the land of this shoulder. This experimental work has been going on for some months, but no definite results have yet been released.



This toolholder, used by the General Motors Corp., for round carbide inserts, positions the insert in the end of the toolholder by means of a set screw in the bottom and anchors it by the cross set screws.



Super Tool Co., Detroit, markets this type of carbide insert tool under the brand name Ejector tools. The tools shown here have shoulder ground into the carbide inserts.



This style toolholder was developed by Kennametal, Inc., Latrobe, Pa., for holding the carbide insert-type tool. The holders are made in right and left hand styles, and provide easy access to the cutting tool.

By letting the insert free to turn in the tool holder, Heald has found in boring that this insert will rotate as the boring progresses. In this manner, no one arc segment of the edge bears the total brunt of cutting and, possibly, the tool remains cooler.

One of the primary difficulties with turning, skiving, or boring with these tools is the fact that, unless an interrupted cut is being made, there is no way to break up the chips. The result is often that the machine must be shut down and the chips cleared away. Where an interrupted cut is being made, this is no problem since the chip breaks at every interruption of the cutting continuity. One company reported that a job had been run with the round carbide insert tool on steel at 5000 sfpm, ending with a chip some 150 ft long. The finish obtained was excellent, but the chip was a problem.

There appears to be no consistency in the matter of tool holders for this type of cutting tool. All, however, seem to have two points in common. First, the insert can be adjusted in and out of the holder by a set screw placed directly under and in the same axial plane as the insert. Second, the insert can be held securely in position by a set screw placed laterally through the tool holder at right angles to the insert or by slotting the holder through the insert seat and pulling the insert up tight with a bolt.

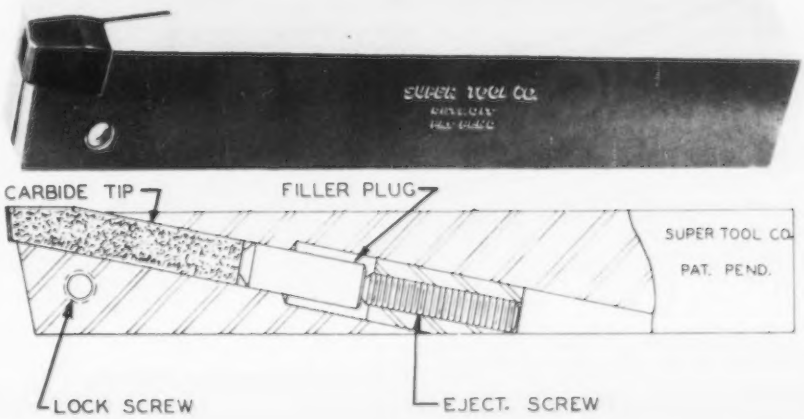
This cutting technique has been tried on turning, boring and skiving operations, on single point tools. As far as is known, it has not been attempted on multiple cutter tools of any kind. Limitations on the use of such single point tools seem to be mainly in the diameter of work being machined, since in machining smaller diameters there is difficulty in getting the tool in proper position with relation to the work being turned or bored.

The use of the square or triangular shaped carbide inserts is identical to that of the round inserts. The corners of these inserts are the cutting edges, and, consequently, the radius of the cutting arc. These tools have three or four cutting positions, whereas the round inserts have considerably more.

o o o

Another method of holding the carbide insert in a standard shaped tool is shown here. This is a Super Tool Co., Ejector-type tool. The long carbide slug permits continued regrinding of the tool, the carbide feeding up through the toolholder as required.

o o o



A Summary of Heat Resistant Alloys

With an accumulation of a large amount of stress rupture data, for the 53 high temperature alloys discussed in this article, the authors are able to present an interesting graphical study indicating the comparative potentialities of many forged and cast metals at various temperature levels. Such a correlated summary, including ductility characteristics at 1200° to 1800°F and creep properties at 1200° to 1600°F, in addition to the stress rupture study, is presented in this concluding part of a three-part article.

WHILE the curves for each set of alloys figs. 1 through 23 tell their own story, some of the following points are worth noting:

(1) Inconel X, fig. 13, shows a severe change of slope on going from 1350° to 1500°F test temperatures, indicating overaging.

(2) For Vitallium, fig. 14, the 1500° and 1600°F curves are very close. This is undoubtedly due to the difficulty of selecting the most representative data for the alloy. Vitallium has such a wide scatter of values even from test bars within the same casting that it is difficult to select the curve. Either the 1500° or 1600°F is not representative.

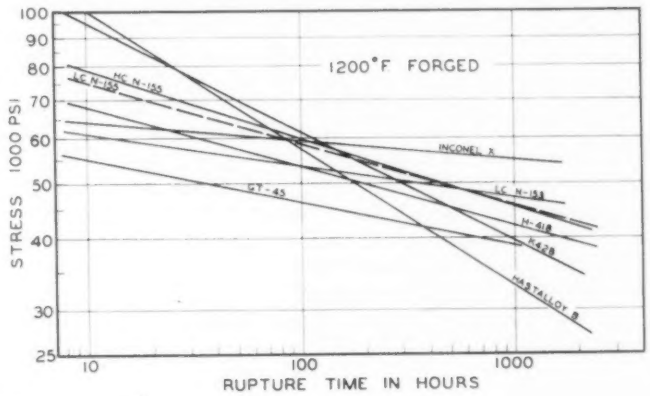
(3) In X-40, fig. 18, the 1350°F curve appears to be too steep on the basis of the 1200° and 1500°F curves.

(4) In S-816, fig. 20, the 1700°F curve should be steeper and should probably lie more evenly between and parallel to the 1600° and 1800°F curves.

(5) In 111VT2-2, fig. 22, the 1800°F curve was obtained from a 1.28 pct C alloy which is not as strong as the 1.11 pct C alloy. This curve should therefore be shifted upward if it is to represent the 1.11 pct C composition correctly.

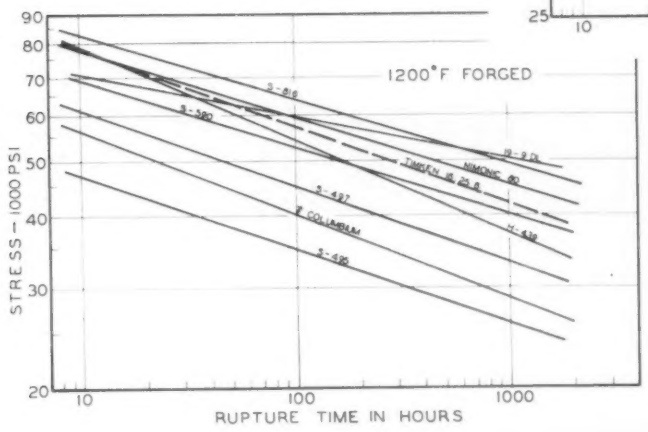
It is proper to mention at this point that close parallelism among the curves from 1200° to 1800°F is a probable sign that no discontinuous structural or chemical changes are occurring over the time range considered.

A more interesting set of graphs is shown in figs. 24 through 43. All of the alloys shown in figs. 1 through 23 are compared in this second



RIGHT

FIG. 25 - Stress rupture curves for various forged alloys tested at 1200°F.



LEFT

FIG. 24 - Stress rupture curves for various forged alloys tested at 1200°F.

from 1200°F to 1800°F

In the first two parts of this article, The Iron Age, March 18, and April 8, respectively, the authors listed the compositions of 53 alloys together with physical property data, and discussed various factors that significantly influence rupture and creep properties. This article is published by permission of the U. S. Navy Bureau of Ships. The opinions expressed here are those of the authors and do not commit the U. S. Navy to any policy.--Ed.

By **NICHOLAS J. GRANT**
and
A. F. FREDERICKSON
Massachusetts Institute of Technology, Cambridge, Mass.
and
M. E. TAYLOR, Metallurgist,
Metallurgical Research & Development Co. Washington

set of figures. In addition those alloys which were not as completely tested are also included in this latter group, that is, alloys which were tested at only one or two temperatures. The forged and cast groups are kept separate for the comparison purposes.

Because it was impossible to put all of the alloys for any one temperature on the same graph without causing confusion, the curves were distributed over several graphs in a manner to provide maximum spacing between adjacent curves. The vertical axis, the stress coordinate, was expanded two-and-one-half times the horizontal axis to provide maximum spacing.

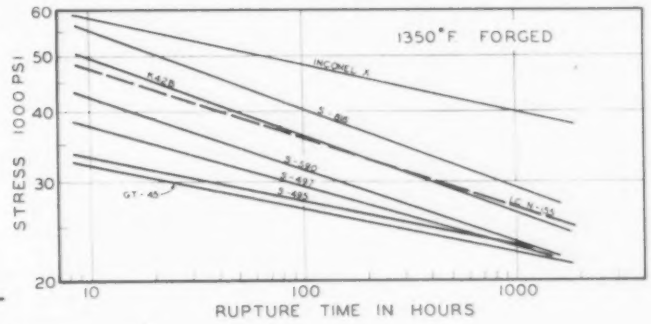
Again one is cautioned against too literal an interpretation of the results without previously checking all the data, especially the prior history of the test.

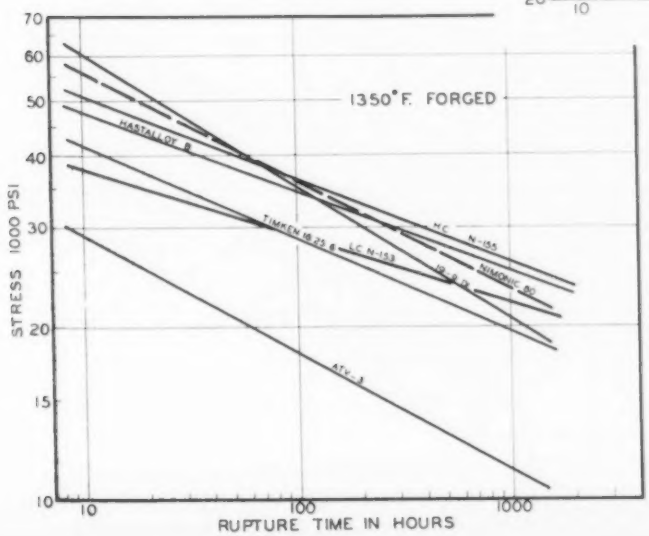
At 1200°F in particular, cold working or hot-cold working treatments will yield high rupture values, particularly for the lower carbon, lower alloy content compositions, which are easier to work without danger of causing cracks.

o o o

BELOW

FIG. 26 - Stress rupture curves for various forged alloys tested at 1350°F.





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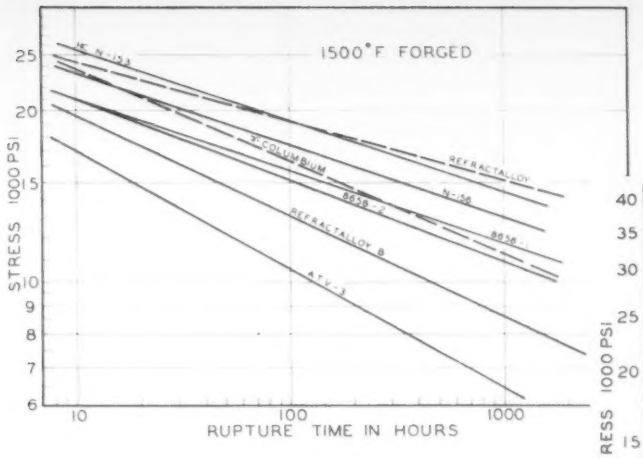
ABOVE

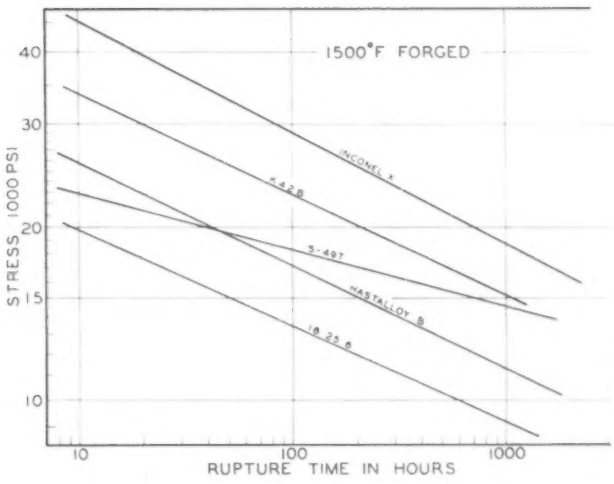
FIG. 27 - Stress rupture curves for various forged alloys tested at 1350°F.

o o o



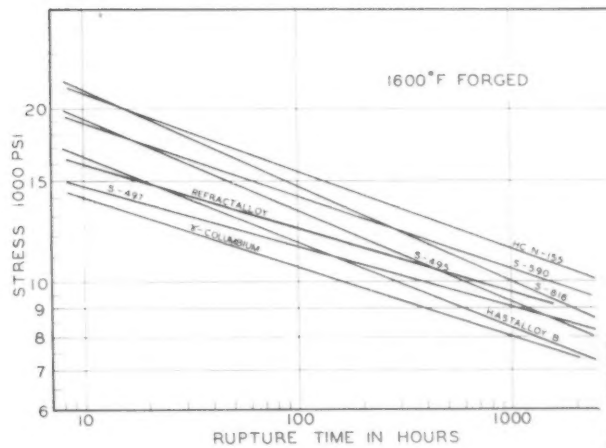
RIGHT

FIG. 29 - Stress rupture curves for various forged alloys tested at 1500°F.



RIGHT

FIG. 31 - Stress rupture curves for various forged alloys tested at 1500°F.

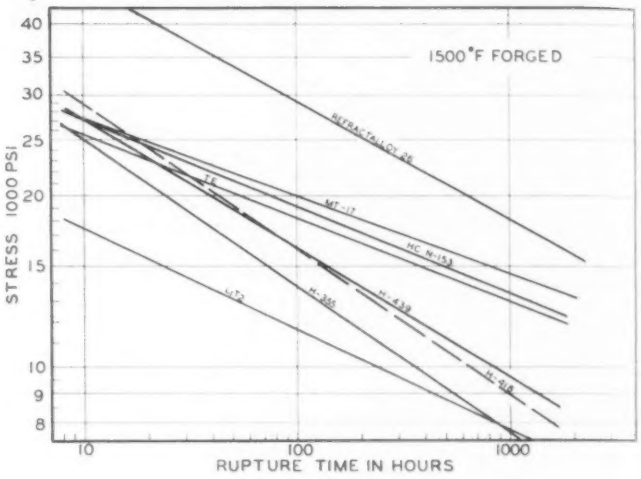


RIGHT

FIG. 33 - Stress rupture curves for various forged alloys tested at 1700°F.

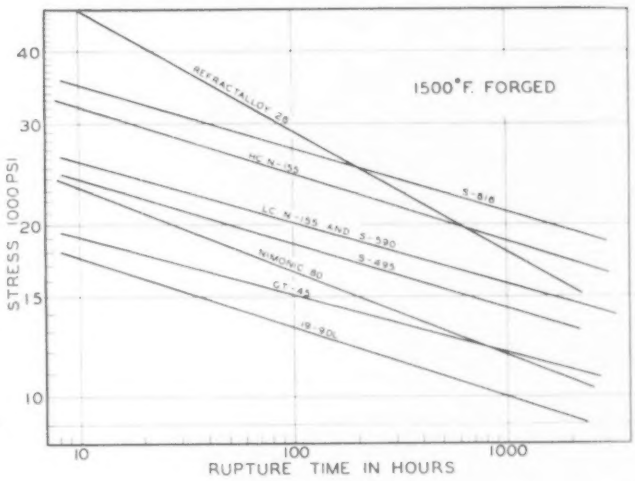
LEFT

FIG. 28 - Stress rupture curves for various forged alloys tested at 1500°F.



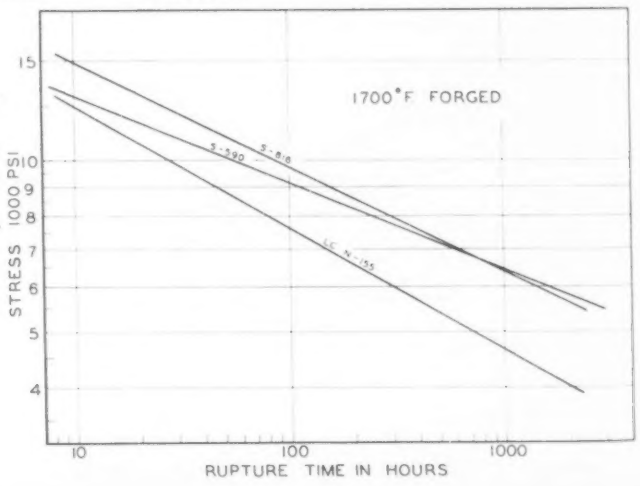
LEFT

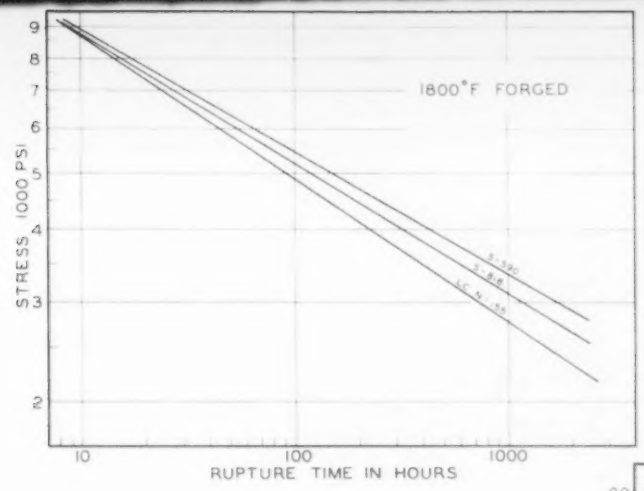
FIG. 30 - Stress rupture curves for various forged alloys tested at 1500°F.



LEFT

FIG. 32 - Stress rupture curves for various forged alloys tested at 1600°F.





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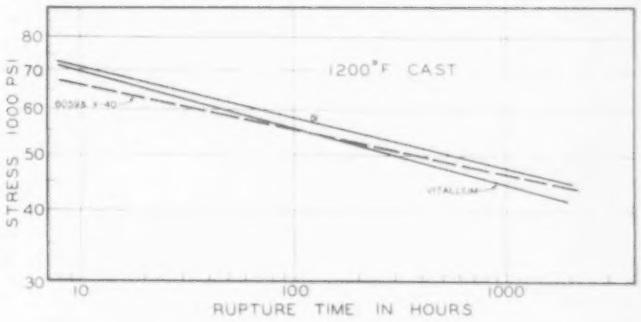
LEFT

FIG. 34 - Stress rupture curves for various forged alloys tested at 1800°F.

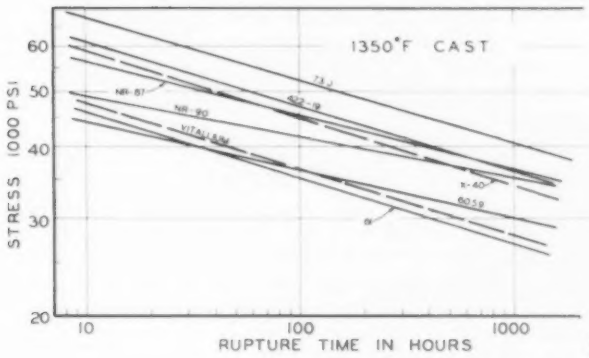
RIGHT

FIG. 35 - Stress rupture curves for various cast alloys tested at 1200°F.



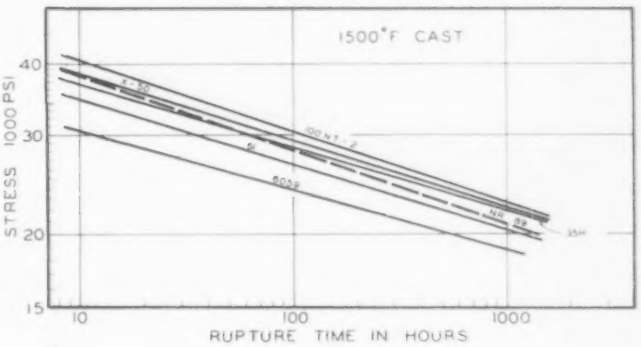
LEFT

FIG. 36 - Stress rupture curves for various cast alloys tested at 1350°F.



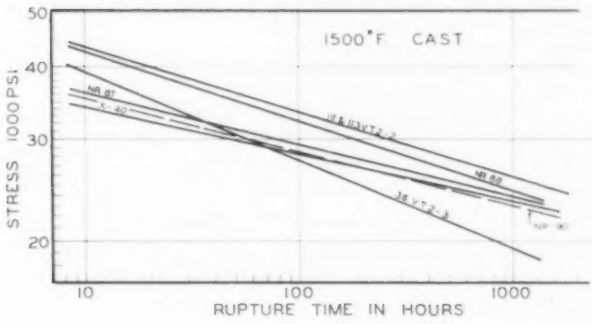
RIGHT

FIG. 37 - Stress rupture curves for various cast alloys tested at 1500°F.



LEFT

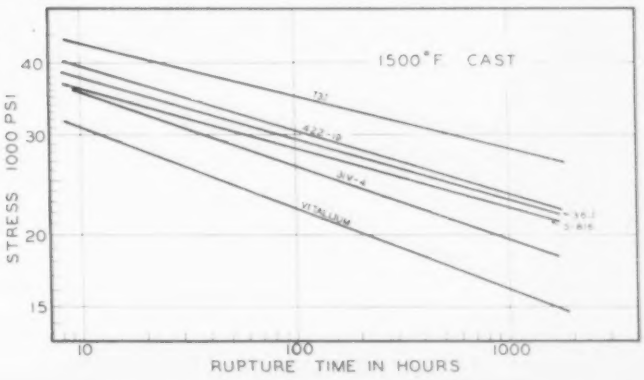
FIG. 38 - Stress rupture curves for various cast alloys tested at 1500°F.

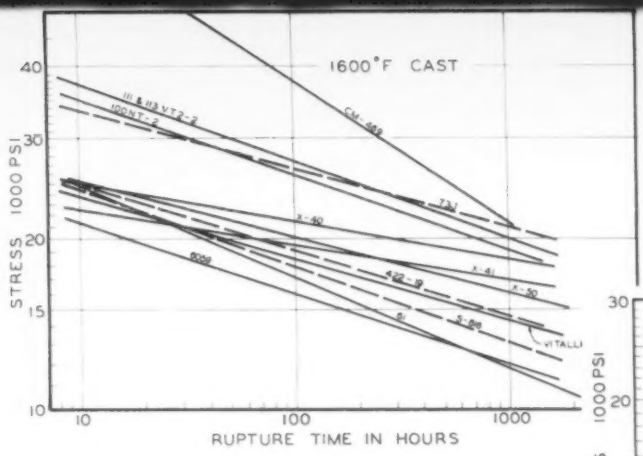


RIGHT

FIG. 39 - Stress rupture curves for various cast alloys tested at 1500°F.

o o o





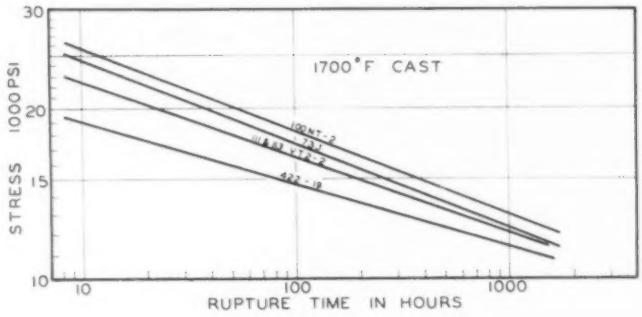
ABOVE

FIG. 40 - Stress rupture curves for various cast alloys tested at 1600°F.

o o o

BELOW

FIG. 41 - Stress rupture curves for various cast alloys tested at 1700°F.



At 1200°F among the forged alloys, the following show high properties: Inconel X, which shows the best values with increasing time, also has the flattest slope (fig. 25). Other strong alloys are N-155, N-153, S-816 and Nimonic 80.

At 1350°F Inconel X still shows the best rupture times. Other good forged alloys are S-816, N-155, and K42B (see figs. 26 and 27).

At 1500°F Inconel X shows a large decrease in strength with time, yielding a steep rupture curve (see figs. 30 and 13). Overaging is undoubtedly taking place, limiting this alloy to temperatures of less than 1500°F where high strength is desired for long periods of time. Alloy S-816 shows optimum rupture values followed by high carbon N-155, low carbon N-155, and S-590 in the forged alloys.

At 1600°F most of the forged alloys show severe losses of strength, leaving only the more highly alloyed compositions such as high and low carbon N-155, S-590, S-816, S-497, and S-495.

At 1700° and 1800°F these same alloys show only fair properties.

Among the cast alloys very few tests have been completed at 1200°F, making it difficult to make any comparisons. Aside from the values shown in fig. 35, incomplete test results on alloy 36J (0.36 pct C) indicate at 1200°F a rupture stress of over 55,000 psi for 1000 hr, which is considerably higher than was attained by alloys 61, X-40, and 6059, shown in fig. 35.

At 1350°F only a few additional cast alloys have been tested. Alloy 73J is considerably superior to the others tested thus far, being fol-

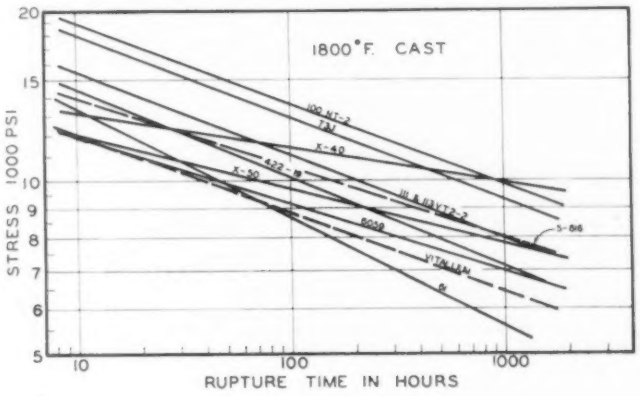


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FIG. 42 - Stress rupture curves for various cast alloys tested at 1700°F.

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RIGHT

FIG. 43 - Stress rupture curves for various cast alloys tested at 1800°F.

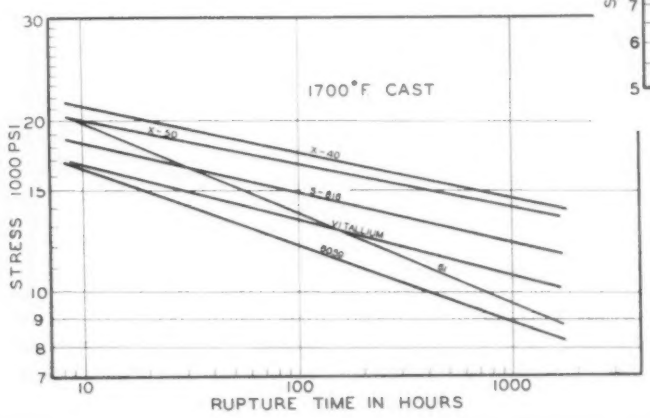

TABLE VI

Creep Rate Data for Forged and Cast Alloys from 1200° to 1600°F

Forged Alloys

Alloy	Temperature °F	Stress for Minimum Creep Rates, Pct per hr, of: 0.001	0.0001	0.00001
Hastelloy B	1200	20,000	7,400	2,650
	1500	4,800	2,800	1,600
Timken	1200	21,500	14,000	9,000
	1500	8,400	5,700	3,800
K42B	1200	29,000	18,800	12,000
	1500	14,000	7,400	3,900
19-9DL	1500	10,400	7,100	4,800
Nimonic 80	1500	15,700	9,500	5,700
Refractalloy 26	1500	15,700	9,500	5,700
N-155 (LC)	1500	9,800	8,300	7,000
S-590	1350		19,000	14,300
	1500	12,700	9,600	7,300
TE	1500		9,500	7,500
Inconel X	1500	19,600	12,300	7,600
N-155 (HC)	1350	25,000	18,400	13,500
	1500	13,800	10,300	7,800
S-816	1350	26,800	18,000	12,200
	1500	16,400	11,500	8,100
	1600	8,500	5,800	4,000
S-497	1350	19,700	15,800	12,800
	1500	12,400	10,000	8,100
	1600	7,800	6,200	5,000
S-495	1350	22,400	16,100	11,700
	1500	12,900	10,400	8,300
	1600	7,900	5,300	3,500
Refractalloy	1500	15,200	12,800	11,000

Cast Alloys

Vitallium	1500	11,700	7,600	4,900
	1600	11,200	7,900	5,600
NR-90	1500	19,900	12,600	7,900
6059	1500	15,000	11,700	9,000
	1600	11,000	9,000	7,300
422-19	1500	18,400	13,200	9,500
	1600	14,500	11,600	9,500
61	1500	17,000	13,000	10,000
X-50	1500	18,200	13,500	10,100
	1600	13,200	10,500	8,500
73J	1500	20,400	14,300	10,100
X-40	1500	18,500	13,700	10,200
	1600	15,700	11,700	8,700
111VT2-2	1500	20,400	15,000	11,000
	1600	15,100	10,300	7,200
93N-2	1500	21,100	16,700	13,000
100NT-2	1500	21,800	17,400	13,800
	1600	16,000	11,700	8,500
110N-2	1500	21,900	18,000	14,800

Forged Alloys

	1200°F Stress for Minimum Creep Rate Pct per hr, of: 0.00001	0.0001	0.001	0.01
Hastelloy B	2,650	7,400	20,000	56,000
Timken	9,000	14,000	21,500	33,500
K42B	12,000	18,800	29,000	46,000
	1350°F			
S-497	12,800	15,800	19,700	24,200
S-816	12,200	18,000	26,800	39,500
S-495	11,700	16,100	22,400	31,000
N-155 (HC)	13,500	18,400	25,000	34,400
S-590	14,300	19,000		
	1500°F			
Hastelloy B	1,600	2,800	4,800	8,200
Timken	3,800	5,700	8,400	12,500
K42B	3,900	7,400	14,000	26,500
19-9DL	4,800	7,100	10,400	15,300
Nimonic 80	5,700	9,500	15,700	26,000
Refractalloy 26	5,700	9,500	15,700	26,000
N-155 (LC)	7,000	8,300	9,800	11,500
S-590	7,300	9,600	12,700	16,700
Inconel X	7,600	12,300	19,600	30,100
N-155 (HC)	7,800	10,300	13,800	18,300
S-497	8,100	10,000	12,400	15,000
S-816	8,100	11,500	16,400	23,200
S-495	8,300	10,400	12,900	15,900
Refractalloy	11,000	12,800	15,200	17,900
	1600°F			
S-495	3,500	5,300	7,900	11,800
S-816	4,000	5,800	8,500	12,300
S-497	5,000	6,200	7,800	9,800

Cast Alloys

	1500°F			
Vitallium	4,900	7,600	11,700	18,000
NR-90	7,900	12,600	19,900	31,500
6059	9,000	11,700	15,000	19,400
422-19	9,500	13,200	18,400	25,200
61	10,000	13,000	17,000	22,000
X-50	10,100	13,500	18,200	24,300
73J	10,100	14,300	20,400	28,800
X-40	10,200	13,700	18,500	24,800
111VT2-2	11,000	15,000	20,400	27,500
93N-2	13,000	16,700	21,100	27,000
100NT-2	13,800	17,400	21,800	27,100
110N-2	14,800	18,000	21,900	26,600
	1600°F			
Vitallium	5,600	7,900	11,200	15,800
6059	7,300	9,000	11,000	13,500
111VT2-2	7,200	10,300	15,100	
X-50	8,500	10,500	13,200	16,400
100NT-2	8,500	11,700	16,000	22,000
X-40	8,700	11,700	15,700	21,000
422-19	9,500	11,600	14,500	17,800

lowed not too closely by NR-90 and X-40. At 1350°F the J alloy shows higher rupture life (for rupture time greater than 1000 hr) than any of the forged alloys, with the exception of Inconel X.

At 1500°F alloy 73J is by far the best cast alloy, and is vastly superior to any of the forged alloys. After 73J, the following show high rupture strength in the cast group: 111VT2-2, NR-88, X-40, 100NT-2 and X-50. Vitallium, probably the most familiar of the cast high temperature alloys, is the weakest of all of the cast alloys grouped here at 1500°F (see figs. 37, 38 and 39).

At 1600°F, alloy 73J continues to show the best rupture properties, followed by 111VT2-2, 100NT-2 and X-40. Alloy CM-469, the chromium base alloy, is included to give a comparison of the best chromium-base alloy with the best cobalt-chromium base alloys. The curve for CM-469 is an average value for a series of points showing a great deal of spread. Because melting and casting techniques are still being improved in the chromium base alloy system, it is expected that a large improvement will be shown by this alloy over what is shown in fig. 40. CM-469 is an extremely brittle and fragile composition, however, and may never be found useful for dynamic applications.

At 1700°F, 73J shows lower rupture strength for the first time, and is exceeded by X-40, X-50 and 100NT-2. Alloy 6059 now shows the lowest values in rupture at 1700°F. See figs. 41 and 42.

At 1800°F, X-40 shows the best properties for long time tests (beyond 1000 hr). The next best alloys (better also than X-40 up to 500 to 1000

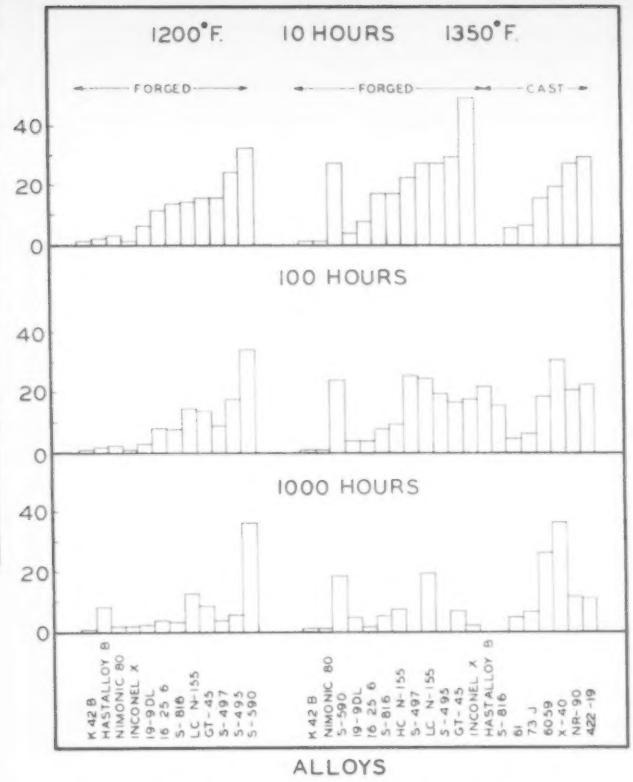

FIG. 44 - A comparative study of ductility values of some of the more promising alloys at 1200°F and 1350°F for 10 hr, 100 hr and 1000 hr respectively.

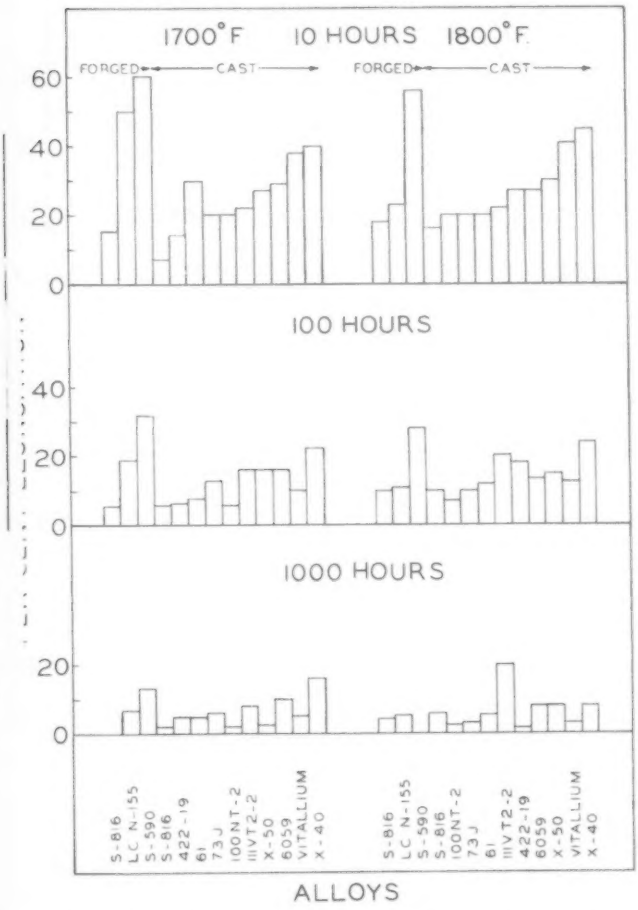

FIG. 46 - A comparative study of ductility values of some of the more promising alloys at 1700°F and 1800°F for 10 hr, 100 hr and 1000 hr respectively.

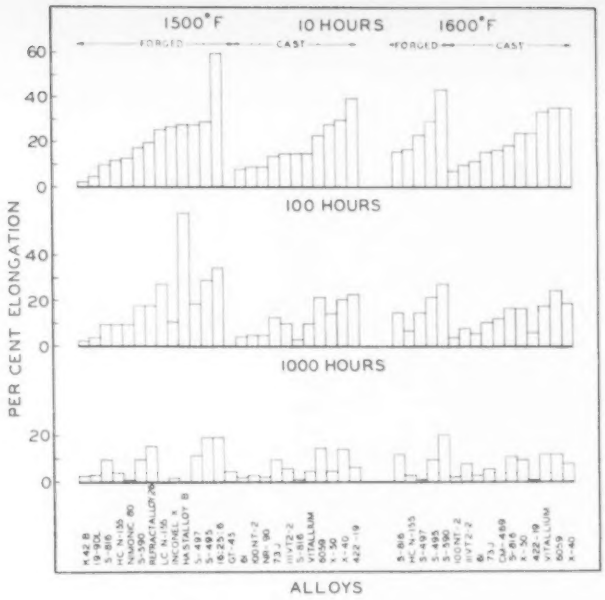

FIG. 45 - A comparative study of ductility values of some of the more promising alloys at 1500°F and 1600°F for 10 hr, 100 hr and 1000 hr respectively.

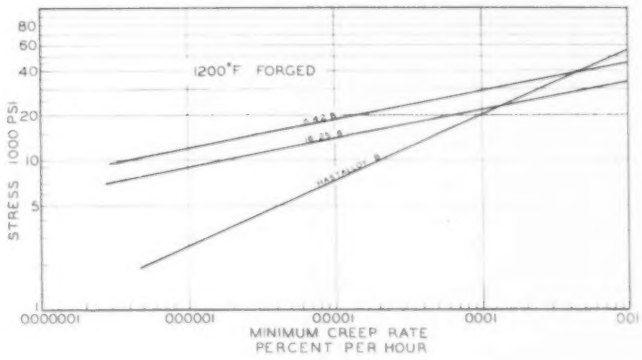

FIG. 47 - Creep data for various forged alloys tested at 1200°F.

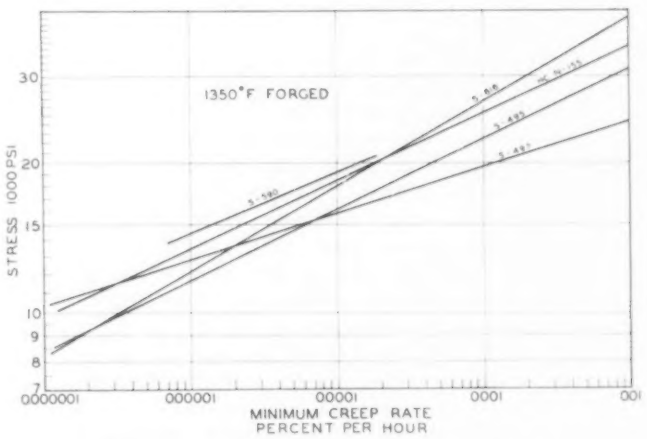

FIG. 48 - Creep data for various forged alloys tested at 1350°F.

hr) are 100NT-2 and 73J. It is interesting to note the unusually flat slope for alloy X-40 in comparison to the other alloys in fig. 43. In view of the not too dissimilar composition of all of the cobalt-chromium base alloys, and in view of the parallelism of slopes at 1700°F, considerable doubt can be expressed regarding the correctness of the X-40 curve in fig. 43 where the slopes are far from being parallel.

Enlongation Charts for Rupture Lives at 1200°F to 1800°F

It is generally true, with occasional exceptions at present unexplainable, that at high temperatures, above the so-called equicohesive temperature, ductility decreases with time at temperature. That this is true can be readily noted in figs. 44 through 46. Elongation is charted for rupture times of 10, 100, and 1000 hr for temperatures from 1200° to 1800°F. The forged and cast alloys are grouped separately. It was mentioned earlier that elongation values often vary considerably. For this reason the values shown in figs. 44 to 46 are the best averages for the chosen test conditions. With few exceptions, the 10-hr rupture life elongations are higher than the 1000-hr rupture life values. This is true with fewer and fewer exceptions as the temperature increases from 1200° to 1800°F.

TABLE VII

10,000-Hr Creep Tests at 1500°F

Alloy	Heat Treatment	Stress, Psi	Creep Rate pct per hr at 1000 Hr	Creep Rate pct per hr at 2000 Hr	Final Reading	Length of Test, Hr
92N-2	2260-WQ	10,000	0.000092	0.000040	0.0000015	6500*
N-155	2300-WQ	8,500	0.000011	0.000018	0.0000022	10,078
S-816	2350-WQ	8,500	0.00003	0.000029	0.000113	10,103

** In progress. Was still in secondary stage of creep at 8600 hr in March 1947.*

At 1200°F, K42B, Nimonic 80, Inconel X, and 19-9DL all show very low ductilities. N-155 and S-590 show little or no change in ductility with increasing time.

The same alloys, except Inconel X, for short times show low ductility at 1350°F as at 1200°F. Again, S-590, low carbon N-155, 73J, 6059 and X-40 show no decrease in ductility with increasing time at temperature. No embrittling effect is therefore anticipated due to overaging, phase transformations, etc.

Alloy S-590 continues to show good ductility at all of the higher test temperatures.

K42B, Nimonic 80, and Inconel X all continue to show low long time ductilities.

X-40 and 111VT2-2 of the cast alloys show good high temperature ductilities from 1500° to 1800°F.

Creep Properties at 1200° to 1600°F

Creep tests require such a long time for completion of tests that only a small number have been run. The shortage of data of this type is unfortunate. Practically all of the tests were run a minimum of 2000 hr in order to approach a definite minimum slope. Actually 2000 hr is not sufficient time to establish a minimum creep rate in a test capable of enduring 20,000 or more hours under load, but from practical aspects the value is satisfactory. Actually the slope decreases beyond 2000 hr, making the 2000-hr test values somewhat conservative and on the safe side. Only a few tests have been in progress for over 4000 hr at 1200°F or higher. Several of these will be listed below.

The curves in figs. 47 through 54 are a combination of minimum creep rates measured from both rupture and creep tests and plotted on a log log curve with stress v. minimum creep rate. The most representative straight line was drawn to fit the points. Very often minimum creep rate values from rupture tests which have lasted over 1000 hr indicate that the stress-creep rate curve should be bowed upward. These points were ignored here because of the high inaccuracy of the strain measurements. In other words, creep rates on the order of 0.0001 pct per hr are being measured by instruments reading to 0.001 in. on a 1-in. gage length. These same rupture tests when rerun on creep equipment yield creep rate values which fit the selected straight line curves shown in figs. 47 through 54.

FIG. 49 - Creep data for various forged alloys tested at 1500°F.

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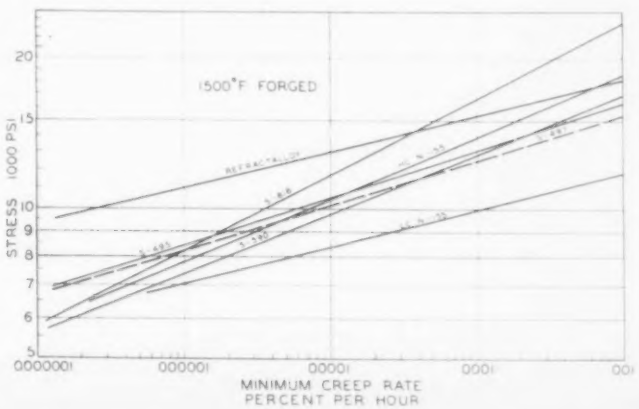
FIG. 50 - Creep data for various forged alloys tested at 1500°F.



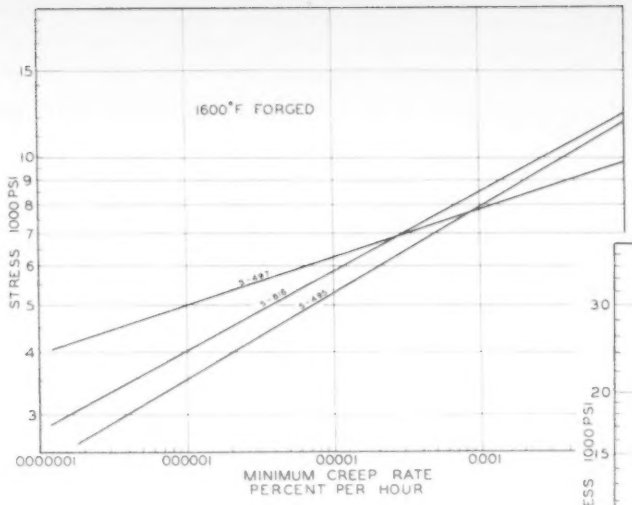


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FIG. 51 - Creep data for various forged alloys tested at 1600°F.

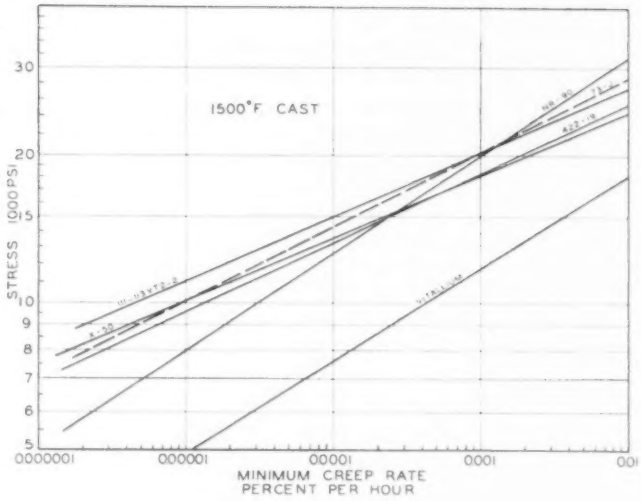

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FIG. 52 - Creep data for various cast alloys tested at 1500°F.

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Forged alloys have been tested in creep from 1200° to 1600°F. At 1200°F, K42B is the best of the three alloys tested, but the stress values are all very low. At 1350°F alloys S-590 (from incomplete data) and high carbon N-155 show the best creep resistance. Alloy S-497 shows a very flat curve, while S-816 shows a steep creep curve (see fig. 48). These alloys at 1350°F show higher creep resistance than do the three alloys shown in fig. 47 at 1200°F.

At 1500°F where the bulk of the creep tests were performed, figs. 49 and 50 summarize the data. Inconel X shows a curve in fig. 49 which of itself is misleading. The creep rate is not high, but the total elongation at failure is so low that the alloy would fail in a relatively short time at the stress and temperature shown. Refractalloy shows the highest values. S-816 again as at 1350°F shows a steep curve. Alloys S-495, high carbon N-155, S-497 and S-590 are all grouped very closely and show similar creep resistance. It might be pointed out that alloys S-495 and S-497 contain only about 15 pct Cr. Their oxidation and corrosion resistance at 1500°F and higher is not as good as that of the 20 pct or more Cr alloys.

At 1600°F only three alloys show complete sets of tests and of these S-497 shows the highest creep resistance, but would find limited application where the 15 pct Cr is not sufficient protection for the particular atmosphere (see fig. 51).

Creep rates are plotted only at 1500° and 1600°F for the cast alloys. The cast alloys with few exceptions show much higher creep resistance than do the forged alloys at 1500° and 1600°F.

At 1500°F (figs. 52 and 53) the stress to cause a creep rate of 1 pct in 100,000 hr (0.00001 pct per hr) varies from about 5000 psi for Vitallium to 15,000 psi for alloy 108N-2. Alloys 93N-2 100NT-2 and 108N-2 show stresses of 13,000 to 15,000 psi for a creep rate of 1 pct in 100,000 hr at 1500°F. These alloys are all high carbon modifications of N-155, which as a low carbon forged alloy shows good creep resistance. These alloys are the nickel-chromium-cobalt-iron base compositions as are S-590, S-497, and S-495. Compared to the cobalt-chromium base alloys the former alloys are much superior in creep, but are generally poorer in rupture (short time) properties. The best cast cobalt-chromium base alloys at 1500°F show 5000 to 11,000 psi for a creep rate of 1 pct per 100,000 hr. Except for Vitallium, which shows the lowest creep resistance, the stress for a creep rate of 1 pct per 100,000 hr at 1500°F is fairly constant at 10,000 ± 1000 psi for 111VT2-2, X-40, alloy 61, X-50, 73J, 6059, and 422-19.

At 1600°F, X-40 and 100NT-2 show the best creep resistance at creep rates of 0.0001 pct per hr and above, while 422-19 is best in the lower creep rate range. The values for Vitallium and 422-19 are inconsistent, however, since the 1600°F curve shows higher creep resistance values than the 1500°F curve in the lower creep rate range.

Table VI lists the stress to obtain various creep rates for temperatures from 1200° through 1600°F. The values are first listed for each alloy at each temperature. In the second portion of the table all alloys are compared for each temperature, keeping separate the forged and cast alloys.

Several recent 10,000-hr creep tests were completed at the U. S. Naval Engineering Experiment Station.* These are, of course, individual, unchecked tests, but the results are interesting for what they show. Table VII summarizes the test results.

** Permission to incorporate these data was granted by the U. S. Navy Bureau of Ships.*

These tests are reassuring in that they indicate the material will last at least 10,000 hr. Alloy S-816 was in third stage creep at 10,000 hr which was not anticipated from other test data, and should be checked further with long time creep tests.

The creep rate at 2000 hr is definitely greater than it would be at 10,000 hr provided third stage creep had not begun, as is indicated in table VII.

Alloy 92N-2 in this test shows the same high creep resistance shown in previous tests.

Endurance Testing

While there are considerable scattered data in the literature regarding endurance or fatigue tests, it is hard to present the data or to make any real evaluation of it. Several different types of tests were used, some of the tension-compression type, others all in tension. The results from one test laboratory have often not been duplicated in other laboratories. Under certain test conditions it appears that the limiting stress is the rupture stress, whereas under other conditions it appears that the fatigue stress is the limiting value. Endurance testing is being studied quite thoroughly at Battelle Memorial Institute. Their subsequent reports should help to clarify the picture.

Of all the test programs, fatigue testing has at present received far too little attention. Partially, this is due to a severe lack of an inexpensive, simple, fatigue testing equipment which is a reliable test unit. A fairly large number of new machines have been developed over the past 5 or 6 years and others are in various stages of completion. When a good fatigue test stand does appear on the market, there is no doubt that this work will be pushed ahead vigorously.

No conclusions are warranted in a summary of this type. One might simply add that a wide range of alloy compositions having a wide range of properties has been developed since 1940. The summary has been kept as brief as possible. This necessitated the complete omission of individual tests. None of the points defining a curve have been shown since for the most part the curves are the average felt to represent best the alloy for the particular specimen history.

For those who will find need to inspect individual test values the following reports will supplement the seven references associated with this article:

(1) Symposium on Materials for Gas Turbines, American Society for Testing Materials, June 1946. This symposium contains three papers on high temperature alloys with a list of OSRD and NACA reports from which the data were gathered. These reports have been compiled by Mr. H. C. Cross of Battelle Memorial Institute and Dr. J. Freeman of University of Michigan and their coworkers.

(2) N. J. Grant, "The Cobalt-Chromium Alloys at 1350° to 1800°F," Bureau of Ships Research Memorandum No. 2-47 (May 1, 1947).

Acknowledgment

The authors wish to acknowledge gratefully the invaluable help of Miss C. Cathey, J. R. Lane, and Lt. W. D. Labrum, U.S.N.

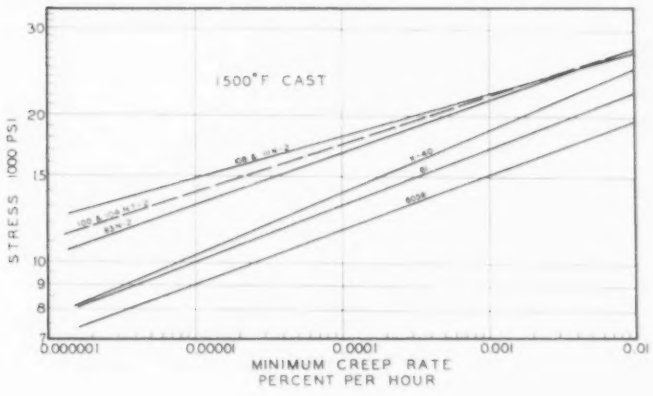

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FIG. 53 - Creep data for various cast alloys tested at 1500°F.

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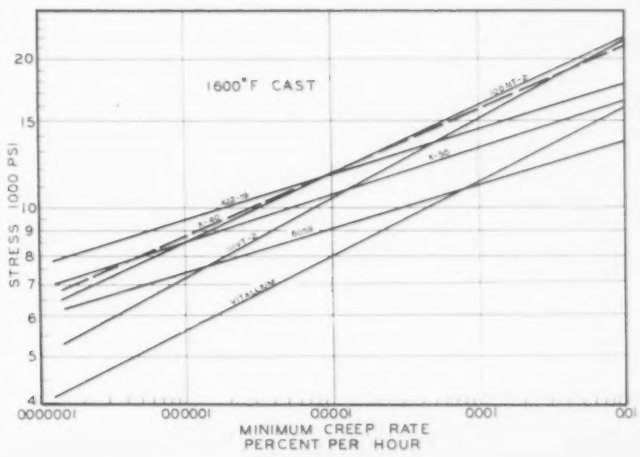

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FIG. 54 - Creep data for various cast alloys tested at 1600°F.

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Porcelain enameled steel murals in full color used in decorating a restaurant front. The murals are composed of unit panels on which the sections of color have been baked.

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Decorating With Full Color Porcelain Enameled Murals

PORCELAIN enameled steel murals using 20 color values have been prepared by a Clevelang ceramic artist, Edward Winter, for the decoration of a restaurant front where durability and ease of cleaning as well as bright colors were required.

The murals, shown in the accompanying illustrations, are composed of a group of panels, about 19 x 22 in. in size, of 16 gage steel enameling stock. Each panel has a 1½-in. flange with a ½-in. return including hooks and lugs for attachment to an iron frame backing.

Overall designs were applied to the panels laid out together on the floor. First the customary base layer of a blue black enamel having a large content of cobalt oxide for improvement of adhesion was sprayed on the metal and the pieces fired at 1560°F. A white cover coat was applied to make subsequent design colors brighter and more luminous and the panels were fired again. Then the sections of color were applied by spraying through templates and the pieces were individually fired at 1540°F for 3 min when a section of the design was completed. About 10 bakings per panel were required, making it necessary to use heavy gage steel to prevent buckling or warpage, before the designs were complete.

In occasional places on the murals lumps of frit were applied to give unusual textural qualities, and liquid gold was also applied, being fused in at the last firing.

Vinyl Plastics For Masking In Electroplating

VINYL type plastic materials for selective masking in electroplating operations have resulted in specific operation improvements at the Allison Div., General Motors Corp., Indianapolis, according to W. M. Martz, chief chemist, and although unsuited to cyanide or alkaline solutions, the materials have been found quite stable in most acid plating baths and capable of being processed through alkaline cleaners as long as temperatures do not exceed 150°F.

Vinyl plastics, such as Liquid Envelope developed by Better Finishes and Coatings, Inc., can be rapidly applied by spray gun, have a relatively short drying time, are able to seal at a cut edge and can be easily removed in one piece. For these reasons they have been found more economical and efficient in some applications than molded rubber masks or conventional type stopoffs, according to Martz.

Where parts are comparatively simple, molded rubber components have been found the most successful at Allison, but for parts involving grooves, holes, undercuts and other irregularities, it becomes difficult to obtain proper sealing with the rubber masks, and the plater has been forced to turn to conventional stopoffs such as the high melting point waxes, lacquers, plastics and others of that general group. These materials have been found to be either slow drying, difficult to remove, contaminating to the bath, hard to apply in production or incapable of sealing at the cut edge. Often more than one of these disadvantages applied to a material or the single drawback was sufficiently serious to bar its use, and in certain of these instances vinyl masking has been successfully applied.

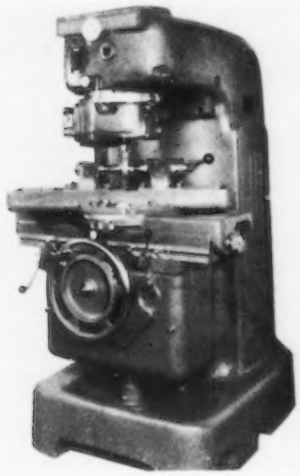
Since vinyl materials are thermoplastic it is doubted that their use is feasible for prolonged periods in plating solutions maintained above 100°F.

New Equipment . . .

A gear shaver, a crankshaft turning machine, multidrillers and tappers, a billet shear with overhead gearing and motor drive, and industrial trucks and attachments are reviewed this week, together with reamers, a milling attachment, centerhole and sapphire plug gages, holding fixtures, and die sets.

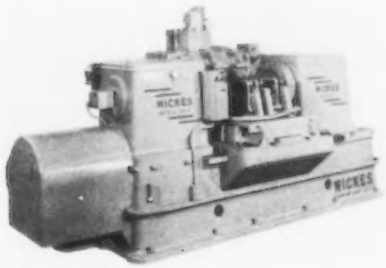
Gear Shaver

GEAR shaving can be either the diagonal or conventional method with the new Red Ring Universal Diagonal gear shaver manufactured by *National Broach & Machine Co.*, 5600 St. Jean Ave., Detroit 13. The machine will handle any conventional shaving operation, that is, where the gear is automatically reciprocated parallel with its axis across the cutter and automatically fed into the cutter vertically at the end of each stroke. Any gear being shaved conventionally can at the same time be given the Elliptoid tooth form by rocking the table as it is being reciprocated. Gears with face widths up to approximately 2 in. may be shaved with diagonal table traverse, that is, where the gear is automatically reciprocated at a diagonal angle to its axis, across the cutter and back, for a total of two strokes. The principle of rotary crossed axes shaving has been retained as a basic characteristic of this machine as has the precision adjustment of the cutter head to obtain any desired angle between the axes of the work gear and the cutter. The machine may be changed from diagonal to conventional shaving in a matter of minutes. Two models are available: GCV-8 in. for gears of 1 to 8 in. P.D.; GCV-12 in. for gears of 1 to 12 in. P.D.



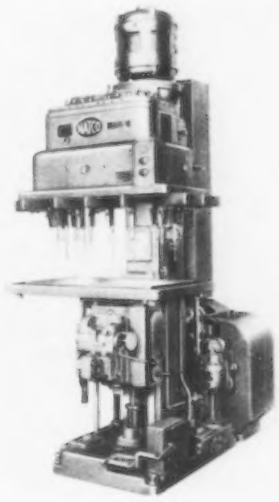
Turning Machine

A DOUBLE end drive crankshaft turning machine for high speed operation has been announced by *Wickes Bros.*, Saginaw, Mich. The machine uses all carbide turning tools and is arranged for the operation of rough turning and finish turning the outside diameter of the six counterweights as well as rough turning and finish turning clearance chamfers on the six crankarms all simultaneously on a 4-throw five main line bearing V-8 type forged crankshaft. The machine is completely automatic and capable of producing 35 crankshafts per hr. Front and rear cam operated angular cross slides as well as longitudinal turning slides are mounted in the back tool housing. Hydraulic feed is provided to all tool slides. The machine is powered by a 40 hp main drive motor.



Multidrillers and Tappers

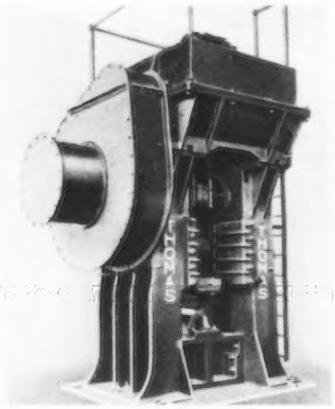
A NEW line of high-speed multidrillers and tappers, announced by *National Automatic Tool Co.*, Richmond, Ind. consists of heavy duty and light duty Model H-5 and H-6 multispindle drillers and tappers and replaces the standards of G-5 and G-6 models. The two models are of similar design, varying only in the size of the drilling area of the head, horsepower of head drive motor, number of spindles in the head and size of work table. They may be furnished as a driller only, as a tapper only, or as a combination driller and tapper. They are provided with change gears and a quick change speed mechanism for correct spindle speeds, and a vertical adjustment on the spindles to compensate for the grinding of drills or the use of different length drills. A feature in the design of the spindle proper permits float for tapping operations and a reversing motor drive eliminates belts and clutches for tapping operations. The large table may be arranged with either a combination hand and foot feed or a hydraulic power-operated feed. Model H-5 may be furnished with a 7x12-in. rectangular drilling area head, and is provided with twelve $\frac{3}{4}$-in. diam upper joint drives; Model H-6 may be furnished with a 10x24-in. rectangular drilling area head provided with twenty-four $\frac{3}{4}$-in. diam



upper joint drives. Both heads are equipped with the independent change of spindle speeds which provide two speeds and neutral for each spindle.

Billet Shear

ANNOUNCEMENT of a billet shear with gears and motor drive overhead and moving parts enclosed saving approximately 50 pct of the floor space normally required, has been made by *Thomas Machine*



Mfg. Co., Pittsburgh 23. Construction features include cast steel housing, air operated multiple jaw type clutch and cast steel herringbone cut gears running in oil bath. A typical unit in this line is the 1200-ton machine illustrated which is used to obtain test pieces from rollings of structural shapes in a steel mill.

Reamers

DEVELOPMENT of a line of lower-priced reamers known as Spe-D-Cut reamers has been announced by *Wendt-Sonis Co.*, Hannibal, Mo. These reamers are for ferrous and nonferrous metals and feature precision tolerance of 0.0005 in. on the diameter, and diamond-lapped cutting edges. Straight shank styles and size ranges have been standardized on this line which is available in 13 diameters. For taper shank requirements, a standard split sleeve reamer driver is used with the straight shank tool.

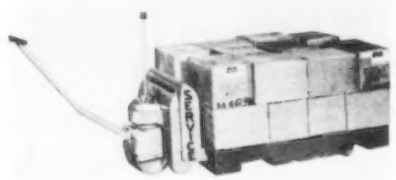
Center Hole Gage

FOR turning out uniform center holes on mass-produced precision parts, a direct reading measuring gage known as the Center Master has been made available by *Elmor Co.*, 17 East 45th St., New York 17. Employing a simple leverage principle, Center Master translates the center dimensions into terms of its diameter. It is the true diameter which is indicated on the dial. Its lightweight, portability and

compactness make it suitable for checking centers up and down the assembly-line. Adjustable range is ¾ to 1/32 in.

Lift Truck

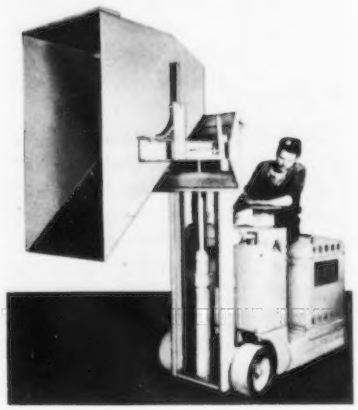
DEVELOPMENT of a Leverlift truck for double faced pallet handling is announced by *Service Caster & Truck Corp.*, Albion, Mich. Features of the model include a set of toggle booster rollers designed to float the truck frame over the bottom face of the pallet to prevent displacement when inserting the truck. A hand-operated release valve is provided to permit fast or slow lowering speed at the will of the operator. The unit, of



pressed steel which is arc welded, is available in 4000-lb capacity. Lowered height is 3¼ in. and the lift is 4 in.; overall height is 27 in. It is available in fork lengths of 36, 42, 48, 54, and 60 in.

Dumping Hopper

DESIGNED to handle all kinds of bulk materials such as small castings and scrap metals, a self-dumping hopper attachment applicable to Lewis-Shepard gas or electric power fork trucks has been announced by *Lewis-Shepard Products, Inc.*, 282 Walnut St., Watertown 72, Mass. Operation of the hopper is completely controlled by the operator from his position on the fork truck. To load the hopper the fork truck is maneuvered under the discharge orifice to receive the materials to be handled. At the discharge point, the hopper is elevated. Without leaving his position, the operator releases a holding latch, and the hopper dumps the load. The hopper returns itself to normal position and latches in an upright position. Constructed of steel, arc-welded for strength, the



hopper is furnished in a range of cubic feet capacities depending on the materials to be handled, and upon the capacity of the fork truck with which it is to be used.

High Frequency Contactors

FOR heating or hardening applications using power of high frequency for the heat-treating or hardening operations, *Electric Controller & Mfg. Co.*, Cleveland 4, has a new line of contactors developed specifically for the closing and opening of these high frequency power circuits. Known as the Type LZ of Line-Arc design, these contactors are of double-pole construction, using one pole to open each side of the line. Their blow-out coils are not subject to excessive heating from eddy currents, but introduced in the circuit at the time the contactor starts to open to interrupt the flow of current. The flexible connector to the movable contact is so shaped that the magnetic field surrounding this connector directs the arc upward to the arcing-plate and blow-out-guard as the contactor opens.

Milling Attachment

SAID to increase the scope of vertical milling machines and other machine tools, an auxiliary, precision, horizontal milling attachment has been announced by *Bemis & Call*

Co., Springfield, Mass. This new milling head, adjustable to nearly any position, handles precision milling, drilling and boring at any angle, making it possible to do all the necessary machining with the original

setup. Accommodating one or more cutters up to 4 in. in diam, it also will take a standard chuck of ½-in. capacity for drilling, boring and reaming at a 90° angle to the drive shaft. The attachment is precision built, with a gear ratio of 1:3.

Flexible Coupling

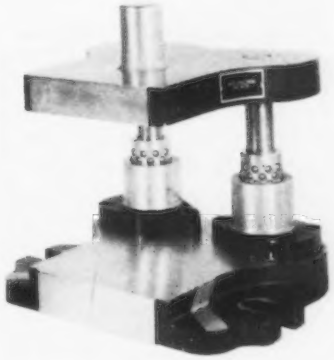
A RECENT design improvement has increased the wearability of the American flexible coupling as much as 30 pct, according to an announcement made by the manufacturer, *American Flexible Coupling Co.*, Erie, Pa. The only part that absorbs wear in these couplings is the center member or block which has a free sliding action between the two jaw flanges of the coupling. This center member is faced with bearing strips which are the points of contact with the jaw flanges. The center block has been improved so that the bearing strips now slide upon the center block to which they are secured, reducing, it is said, the friction which results between the strips and the flanges as the coupling rotates. Purpose of the American coupling is to permit shafts to operate misaligned without transmitting reactionary stresses which may increase the bearing temperature and accelerate the rate of bearing wear in the prime mover or driven machine.

Y Strainer

SUITABLE for close quarter as well as normal installations, since the perforated strainer sleeve fits snugly into the body, a high pressure Y type strainer for pressures up to 600 lb has been added to the line of Y strainers manufactured by *J. A. Zurn Mfg. Co.*, Erie, Pa. The strainer is made with threaded flanged or welded connections in many standard sizes or to specifications. It is said design reduces pressure drop through the strainer to a minimum. The unit is provided with a bolted blow-off connection for blow-down cleaning. It is manufactured in various metals including cast bronze, brass, cast iron and cast steel. A magnetized strainer plug for intercepting small ferrous particles is available.

Die Set

THE new Acrolex die set has been designed to include all the features of anti-friction construction at a lower cost than heretofore possible. Advantages claimed for



the anti-friction die set are: Preloaded anti-friction ball bearings between leader pins and bushings prevent lateral motion; sets open and close freely and easily by hand; and lubrication is simple and positive. It is also claimed that dies last longer, with more production between die grinds. *Evans Reamer & Machine Co.*, New Lexington, Ohio.

Holding Fixture

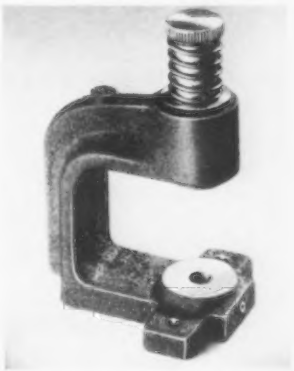
FOR general or specific tool room application a new holding fixture for jig borers or jig grinders will show a guaranteed accuracy of 0.0002 in., on any plane or point of the fixture. This accuracy also applies to the squareness and parallelism in any direction. The fixture is adaptable to vertical milling machines, drill presses, profile machines, slotters, and engraving and etching machines. Whether used for machine application, inspection or for limited production purposes, there are many constants provided from which working points are established, expediting setup and giving assurance of accuracy in reproduction. *Hanson and Co.*, 6527 Russell St., Detroit 11.

Vibration Damping Socket

MOLDED Neoprene Edison base lamp sockets claimed to prolong the life of electric lamps by protecting bulb filaments from surrounding vibration are now available from *Mines Equipment Co.*, Dept. 32, 4215 Clayton Ave., St. Louis 10. The socket is molded as a unit to a resilient rubber mounting diaphragm that fits a standard 4-in. wall outlet box. All necessary metal parts such as female sockets, wires, connections, are protectively encased in Neoprene. A rubber bead on the socket mouth is designed to fit the bulb neck snugly and seal the assembly against water, dust and oil.

Sub-Press

CALLED the Paragon Self-Aligning Sub-Press a new press for use with kick, arbor, air or punch presses has been announced by *Paragon Metal Products*, 844 W. Adams St., Chicago 7. This low cost press is said to increase the productive capacity of every type of press by eliminating the need for complicated and time-consuming setups for staking, piercing, bending, numbering, forming, assembling operation on small piece parts. Each operation



can be tooled in a matter of seconds, and the setup left permanently in the sub-press. When a change in operation is desired, the sub-press with the required setup is put in place on the power or hand press bolster and the production run is

resumed in a matter of seconds. Perfect alignment, regardless of the inaccuracies in moving parts of the kick, air or punch press is claimed because the ram and die holes are line bored to precise tolerances.

Industrial Scale

DEVELOPED to meet portable weighing requirements indoors or out, a 15-in. dial industrial scale offered by *W. C. Dillon & Co., Inc.*, 5410 W. Harrison St., Chicago 44, has been designed primarily for heavy duty weighing and is available in a range of from 0 to 10,000 lb. The 15-in. dial has been provided to permit reading at a distance. Injury through accidental overload is said to have been eliminated. The scale is attached to a hook and may be carried from location to location.

Aluminum Paint

PRODUCTION of Heatrem, a high-heat resisting aluminum paint has been announced by *Speco, Inc.*, 3142 Superior Ave., Cleveland 14. It has been made specifically for use on exterior and interior metal surfaces where temperatures reach 1500°F or any wood, brick or concrete surfaces exposed to extreme heat. According to the manufacturer, Heatrem actually fuses with metal surfaces to form a permanently bright, elastic finish that resists moisture, corrosion, acids, alkalis and industrial fumes. It is said to set up in 4 hr and dry completely overnight.

Zinc Anode

KNOWN as Flat Top because of its shape, a new form of zinc anode is being manufactured by *Wagner Bros. Inc.*, 413 Midland Ave., Detroit 3. The anode is so distinctive in appearance as to prevent accidental confusion with cadmium or tin ball anodes. Its shape is retained throughout the plating process providing easy identification, and it is claimed the effective plating area is from 20 to 25 pct greater than a ball of like diameter.

Carbon Arc Torch

A CARBON arc torch for use with ac welding machines which has been developed for jobs where the application of heat is desired without melting the metal being worked on, has been announced by *Lincoln Electric Co.*, Cleveland 1. With the arc torch a high temperature flame is produced between two copper coated carbon electrodes clamped in aluminum alloy jaws. Both carbons are adjustable and geared to move together so that the angle of carbons

may be kept constant. Thumb control tabs geared to adjust the distance between carbons are located on the handle. In operation, the carbons are brought together to produce the arc and the proper flame is automatically obtained by reversing one of the thumb tabs until the gears lock. Jaws are designed to hold a 5/16 or ⅜-in. diameter carbon. With an ac welder, the torch can be used for brazing and soldering work, general heating and for hard surfacing of thin materials.

Lightweight Soldering Iron

AN electric soldering iron, suitable for very light soldering such as instruments, electric appliances, radios, etc., and weighing only 5½ oz has been added to the line manufactured by *Hexacon Electric Co.*, 144 W. Clay Ave., Roselle Park, N. J. Hatchet design makes the iron effortless to use, it is stated. No transformer or other cumbersome equipment is required to operate the iron. Tip is ¼-in. diam; ⅛ in. tip can be furnished. The iron uses 110 or 220 v circuit ac or dc, any cycle.

Liquid Level Indicators

A MAGNETIC-type instrument for liquid-level indications on transformers has been announced by *Westinghouse Electric Corp.*, 306 Fourth Ave., Pittsburgh 30. The instrument consists of two separate, independently replaceable assemblies. The bezel or outer assembly includes the calibrated dial and the indicating needle, which is directly mounted on a shaft carrying a powerful magnet. The body is a sealed unit enclosing another powerful magnet directly coupled through a shaft to the float arm. Any motion of the float arm rotates the body magnet which in turn displaces the bezel magnet and the indicating needle. An alarm contact is also available for low-level indication.

Sapphire Plug Gages

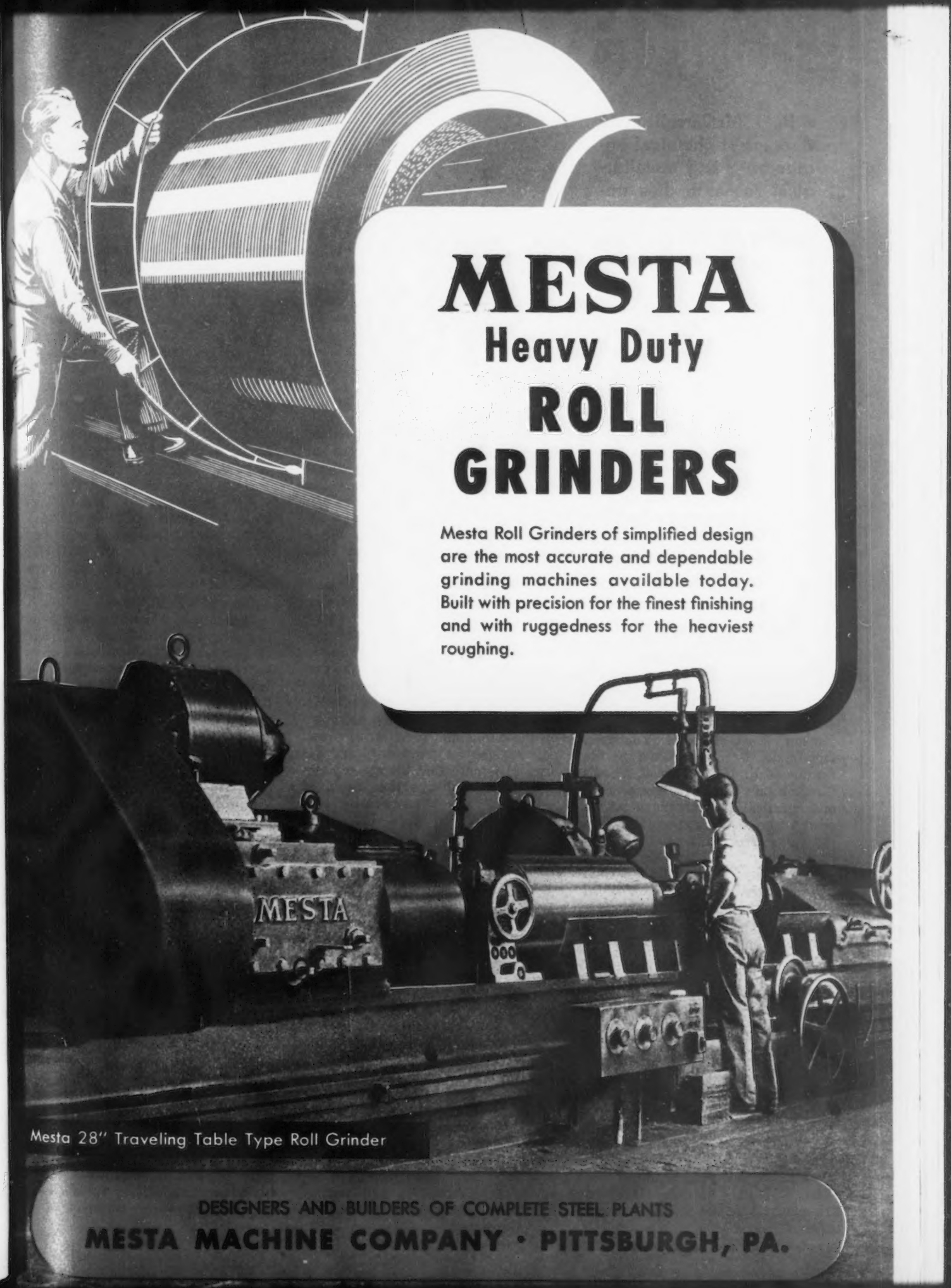
METAL tipped sapphire plug gages which resist accidental damage while preserving the full advantage of sapphire's extreme wear resistance are being introduced by *Sapphire Products Div., Elgin National Watch Co.*, Aurora, Ill. The metal leader is metallically bonded to the gaging member by an exclusive method. Combined with a flexible handle, this tool will produce more gagings per day with less operator fatigue, it is claimed. Sizes range from 0.20 to 1.000 in.

Industrial Spot Light

POWERFUL enough to illuminate clearly welding, cutting, or brazing work when viewed through a No. 10 welder's glass before striking the arc, an industrial spot light has been announced by *Westinghouse Electric Corp.*, 306 Fourth Ave., Pittsburgh 30. One of these spot lights casts a small-diameter circle of light of from 2500-foot-candle brilliance when placed 3 ft from the work to 1000 footcandles when located 6 ft away. Two or more lights can be used if desired for any application requiring a small area of very high illumination. The spot light uses a 6 v sealed-beam type of lamp operated from a transformer built into the light housing, the complete assembly weighing approximately 5 lb.

Die Lubricant

A DIE lubricant for press forging brass which has been announced by *Acheson Colloids Corp.*, Port Huron, Mich., is said to have such advantages as better parting, cleaner and sharper forgings, improved surface finish and longer die life. The lubricant is a special dispersion of semi-colloidal graphite supplied in concentrated form that is simply added to another fluid.



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ROLL GRINDERS

Mesta Roll Grinders of simplified design are the most accurate and dependable grinding machines available today. Built with precision for the finest finishing and with ruggedness for the heaviest roughing.

Mesta 28" Traveling Table Type Roll Grinder

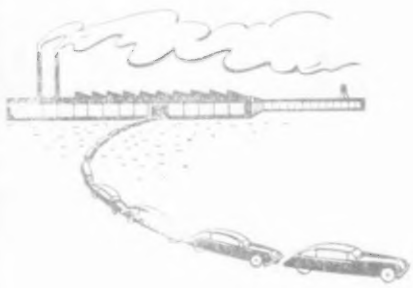
DESIGNERS AND BUILDERS OF COMPLETE STEEL PLANTS

MESTA MACHINE COMPANY • PITTSBURGH, PA.

Assembly Line . . .

WALTER G. PATTON

• R. H. McCarroll, Ford director of chemical engineering and metallurgical research dies unexpectedly after 33 years service . . . Held many engineering and metallurgical honors.



DETROIT — Last Saturday morning Christ Church in Dearborn was filled to overflowing at 11:00 a.m. as the minister began to read slowly from the Episcopal prayer book. Seated together three rows from the front on the left were top Ford officials—Benson Ford, Breech, Youngren and Davis. Across the aisle sat the family of R. H. McCarroll, Ford's director of chemical engineering and chemical and metallurgical research who died unexpectedly while returning from a northern Michigan fishing trip. Mr. McCarroll's death occurred just a little less than a year after that of Henry Ford and from the same cause—a cerebral hemorrhage.

Seated together in the section usually reserved for the church choir were M. L. Bricker, vice-president and director of general production, Del S. Harder, vice-president and director of manufacturing and more than 30 men who are members of Mr. McCarroll's "team" at the Rouge plant. Some of these men, like J. L. McCloud and Fred Young, were associated with Mr. McCarroll during his entire 33 years at Ford. (A fourth member of the group, John Wandersee, retired less than a year ago.)

In addition to his Dearborn friends and fellow workers, there was present practically a "Who's Who" of Detroit's metalworking industry—steel company officials, heads of automobile parts companies, metallurgists from many Detroit industrial plants, representatives from SAE, ASM and other technical societies.

Detroit papers carried only a brief mention of Mr. McCarroll's death. The latest book on Ford Motor Co., "The Last Billionaire," by William C. Richards, does not mention him. To Detroit's metalworking fraternity who knew him for many years and who were in a position to evaluate his contributions to his company and the industry, this was indeed a remarkable omission.

If a poll had been taken among those acquainted with Mr. McCarroll's work at Ford he might have been referred to as: "The best materials and process engineer in the industry: or as "The man who carried the greatest engineering responsibility in Detroit. Still Mr. McCarroll was virtually unknown to the public and the Detroit press. His passion for anonymity and his firm insistence that his accomplishments were always the result of cooperative effort helped to make this situation possible.

R. H. McCarroll

When the huge Rouge pant was near-completion, Mr. McCarroll was given responsibility for chemical control of various units going into operation—first the coke ovens, then the blast furnaces and later the foundry.

Operation of the Ford foundry as an adjunct of the blast furnace is an arrangement that is unique in the auto industry. Working under Mr. McCarroll's direction, groups of Ford engineers have developed special alloys and casting methods for cast steel crankshafts, "self-hardening" camshafts and special gear blanks.

INFORMED sources agree that through the years Ford's greatest strength has been its superiority in materials and processing. Engineering and styling have lagged behind — until recently. However, as Ford's competitors readily admit, steady progress has been made at Dearborn in the specification and processing of materials.

He and his associates made great strides in process and quality control. During World War II many U. S. plants used process control methods developed by the SAE War Engineering Board. These methods followed closely the practices used at Ford's Rouge plant.

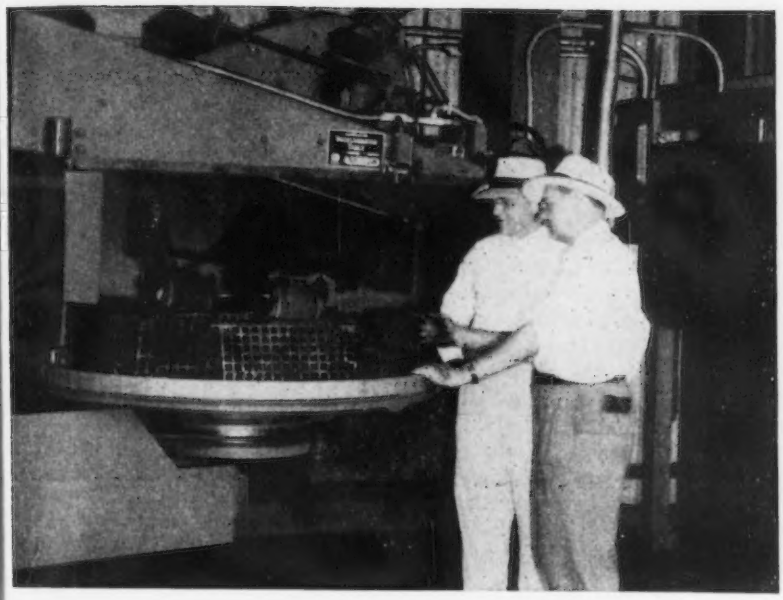
In addition to being sound as to fundamentals, Mr. McCarroll seemed to have grasped the idea that is so frequently associated with the late Henry Ford, "How do you know it can't be done?" Then he would do it.

He held more than 50 patents, chiefly in the field of metallurgy. Mr. McCarroll directed the development of centrifugal casting at Ford—a process used to great advantage during World War II in the mass production of cast sleeves for aircraft engines. This development was especially useful since forged sleeves were unattainable in the quantities required. He also directed the development of new valves, push rods and other parts.

Despite his great responsibilities, Mr. McCarroll always saw anyone who requested an audience with him. For many years he was practically the only Ford engineering executive in contact with the outside world.

MR. McCarroll established a reputation for himself among the Ford officials at Gate 4 for his patience and the depth of his knowledge of many engineering subjects. Ford production executives found his advice particularly valuable. He talked quietly—but he spoke with

WHEELABRATORS
Stop the profit leaks
in Cleaning PUMP PARTS



Pump impellers are cleaned in 2½ minutes on this 48" Wheelabrator Swing Table at Arkansas Foundry Co., Little Rock, Arkansas.

YOU CAN BANK ON THIS KIND OF PERFORMANCE

A comparison between the speed-cleaning production of Wheelabrator equipment versus airblasting is strikingly illustrated in the case of a 48" x 72" Wheelabrator Tumblast (30 cu. ft. capacity) installed at Oil Well Supply Company, Oil City, Pa. This machine is used for cleaning heavy loads of steel castings which include heavy pump parts with deep pockets and channels. The majority of the work is handled in the Wheelabrator in 10 to 15 minutes time.

According to the cleaning room foreman, they clean more work in 8 hours in a Tumblast than they could possibly clean in an entire week (total of 56 hours) in two sand blast rooms.

The Airless Wheelabrator is helping pump manufacturers to increase their profits because it effects 3-way savings in the blast cleaning of pump parts:

First, by using centrifugal force to hurl the abrasive, the Wheelabrator eliminates many costly and troublesome items of equipment. As no compressed air is required, there is a tremendous saving in horsepower.

Second, its fast cleaning speed and its high production output combine to slash cleaning costs to rock-bottom. Less manpower is required. Hours of cleaning time are saved. Valuable floor space is relieved that otherwise would be needed for extra machines and storage of uncleaned work.

Third, the Wheelabrator cleans so thoroughly that machining and grinding are faster, cutting tools last longer, inspection is simplified, and final finishes adhere in a permanently tight bond.

PUMP PARTS BEING WHEELABRATED: Housings, bodies, impellers, covers, pedestals, manifolds, shells, vanes, motor housings, bearings, gears, valves, plates, pinions, cranks, rotors, gear guards, cylinders, liners, motor supports.

TYPICAL USERS: The Wayne Pump Co. ● Red Jacket Mfg. Co. ● American-Marsh Pumps, Inc. ● Blackmer Pump Co. ● Goulds Pump Co. ● National Pumps Corp. ● Gilbert & Barker Mfg. Co. ● Ingersoll-Rand, Inc. ● Worthington Pump & Mach. Corp.

Send for this new illustrated booklet devoted entirely to the Cleaning Problems of the Pump Industry.

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510 S. Byrkit St., Mishawaka 3, Indiana

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

authority. He rose steadily in the Ford organization, an outstanding exception to the rule that for many years college graduates appeared to have little standing in the Ford hierarchy.

Over the years Mr. McCarroll built up a strong staff of assistants. His men stayed with him. His department is today practically the only one that has not been turned upside down in the reshuffling that is taking place at the Rouge. The scope of his knowledge and his ability to win cooperation made him essential in any Ford reorganization plan.

Mr. McCarroll was the inventor of a process used by Ford in the manufacture of artificial leather. He devised a system of fuel handling which enables Ford to obtain an unusually high yield of byproducts from its coking operations. He held the key role in the elder Ford's soy bean experiments and directed the research work which led to the production of synthetic lacquer from soy beans.

An assignment given Mr. McCarroll only recently and in which he was intensely interested was that of chairman of Ford's Industrial Engineering Committee, Manufacturing Div. This committee plans to examine and modernize all Ford machines and processes. It has already put into effect many changes that will undoubtedly be reflected in reduced production costs of the new models Ford is about to introduce.

A RECENT Ford development to which Mr. McCarroll's leadership contributed is the new Ford forge plant at Canton, Ohio (IRON AGE, p. 163, Jan. 1, 1948), which is now in production. Probably the most modern forging plant in the industry, it will turn out more than a million pounds of forgings a day.

The University of Michigan awarded Mr. McCarroll an honorary Master of Engineering degree in 1937. In part, the citation reads: "A skillful inventor and improver of processes, particularly those for the production of new plastics and lightweight steel alloys."

He was a director of the Engineering Society of Detroit and a national director of the American Foundrymen's Assn. He was also a member of the Technical Board of the Society of Automotive Engineers and the National Executive Council of Tau Beta Pi, honorary engineering society.

During Mr. McCarroll's tenure at Ford Motor Co. approximately 30 million cars were produced. During his time, the company went through three complete model changes. On such occasions his responsibilities pyramided. He had just gone through what has been in some respects the most difficult changeover in the company's history when he was stricken.

SOLD TO EGYPT: The Egyptian Royal Economic Mission is shown inspecting the new model Japanese "Datsun" deluxe, which is being manufactured for export. This model is slightly larger than the one manufactured for domestic market. The Egyptian mission ordered 15 to 20 cars per month to be shipped to their country.

K-F Spikes Rumors

Detroit

• • • **A spokesman for** Kaiser-Frazer Corp. has denied that E. J. Hunt, manager of operations, and N. J. Blake, master mechanic, have resigned.

During World War II Mr. Hunt was in charge of the Chrysler tank arsenal in Detroit. He went to Willow Run at the close of the war to supervize the installation of equipment for the building of Kaiser and Frazer cars.

Mr. Blake was formerly comaster mechanic of Detroit Diesel Div. of General Motors. He served as master mechanic of the Continental Engine Div. of Kaiser-Frazer before being transferred recently to Willow Run.

Kaiser-Frazer officials explained Mr. Hunt's absence from Willow Run by saying he was taking his first vacation in several years.

Blaw-Knox Volume Is High

Pittsburgh

• • • **Blaw-Knox Co.** looks for 1948 volume to equal or better 1947's, according to its recently issued annual report. William P. Witherow, president, reported 1947 volume of over $55 million, about three times the company's best prewar year. Unfilled orders at the end of 1947 totaled $29,500,000, Mr. Witherow said. The report stressed the company's diversification program and emphasis on equipment for the chemical and processing industries. Earnings equaled $2.19 a share compared to 76¢ in 1946.

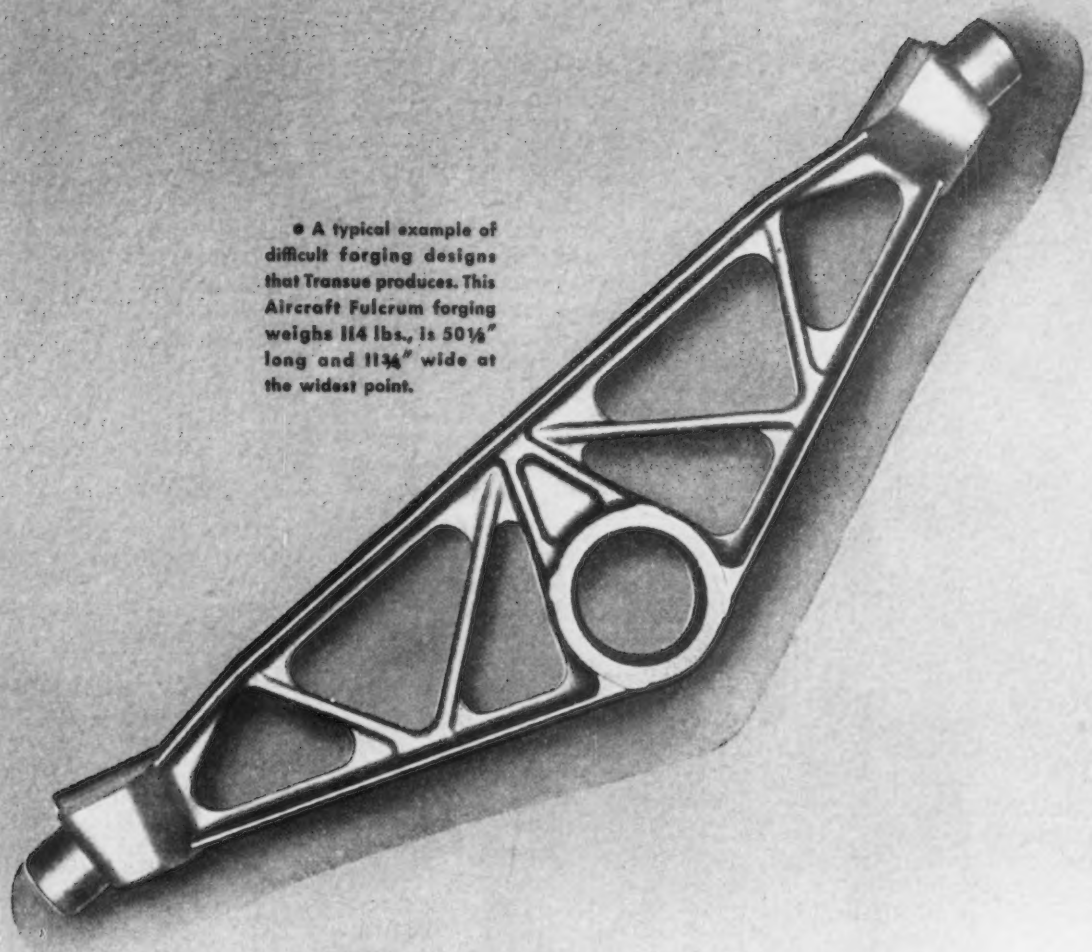
10,000 hp for Coal Plant

Pittsburgh

• • • **More than** 10,000 hp in electric motors will be required to operate the coal cleaning plant which Jones & Laughlin Steel Corp. is building at its consolidated Vesta No. 4 and No. 5 mines.

Westinghouse Electric Corp., in announcing that it had been awarded a contract for all major electric equipment, said that 300 odd motors would be required. The plant is designed to produce 18,000 tons of washed coal daily. This output will require equipment to handle 26,000 tons of raw coal.

TRANSUE FORGINGS



• A typical example of difficult forging designs that Transue produces. This Aircraft Fulcrum forging weighs 114 lbs., is 50½" long and 11¾" wide at the widest point.

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Consult our engineers when you are contemplating conversion to forgings, or when you are in need of reliable forging service.

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OVER 50 YEARS OF FORGING PRODUCTION EXPERIENCE

• Defense needs speed up steel capacity studies . . . Raw material and capital requirements cause concern... Commerce Dept. makes rough estimate on costs.

WASHINGTON — Events of recent weeks have prodded the government agencies studying steel capacity to a point where concrete recommendations on this subject from the Administration should not be long in reaching the light of day.

Previously, government planners had attempted to measure steel capacity in the light of long-term domestic demand. The European Recovery Program, the accelerated national defense program, the loss of production resulting from the coal strike, an almost sure return to military lend-lease—estimated in some quarters at an eventual rate of $2 billion annually—plus continued high domestic demand have gone together to make the ultraconservative economic element in Washington change its views on the subject.

Defense planners are particularly concerned. The Munitions Board, for example, plans to discuss the subject with its Iron and Steel Advisory Committee within the next few weeks. Adequacy of iron ore reserves and the progress of beneficiation processes; the ability of the industry to turn out sufficient pig iron in the light of current and estimated shortages of scrap; the adequacy of armor plate capacity; the ability of the steel industry to make a quick shift from the light products of peace to the heavy products of war; the supply position on alloying materials, and the efficacy of new processes, such as oxygen in furnace operation are currently under intensive study by the Munitions Board.

The National Security Resources Board has not yet set up its steel organization, but told THE IRON AGE that steel capacity is high on its list for thorough study once the organizational work is completed.

THE Council of Economic Advisers, which has the President's ear on such matters, has intensified its study of steel capacity and should be coming up with recommendations in the not too distant future.

The Reconstruction Finance Corp., which would finance any government-authorized expansion program, is also collecting data on steel production, consumption and demand.

Surrounding all of this discussion is the question of who should finance any expansion that might be deemed necessary—industry or government. Based on a long-range defense program, Administration leaders now lean toward industry financing. Government aid would be limited to sanctioning higher steel prices and revision of tax statutes. However, in the event of war, the government would undoubtedly step into the financing picture.

See p. 119 for summary of existing controls.—Editor

The cost of any government-sponsored expansion program as well as the drain on raw materials has to a considerable extent sobered some of the more outspoken expansion advocates. It is now realized that careful study must be given to the raw materials situation and the need for controls on non-essential uses of steel, if large-scale expansion is to be undertaken.

A preliminary estimate of the material and capital requirements for a steel expansion program by the Dept. of Commerce illustrates the magnitude of the problem.

TAKING no position on the question of whether capacity should be increased, Commerce steel officials told THE IRON AGE that information in its possession indicates that a 10 or 15 million ton increase in ingot capacity would require the following additional amounts of raw materials:

	10 million tons	15 million tons
Iron ore	10,900,000 net tons	16,350,000 net tons
Coke	7,070,000 " "	10,605,000 " "
Pig iron	6,890,000 " "	10,335,000 " "

These figures take into account the corresponding increase in the production of foundry products that would accompany an increase in ingot capacity.

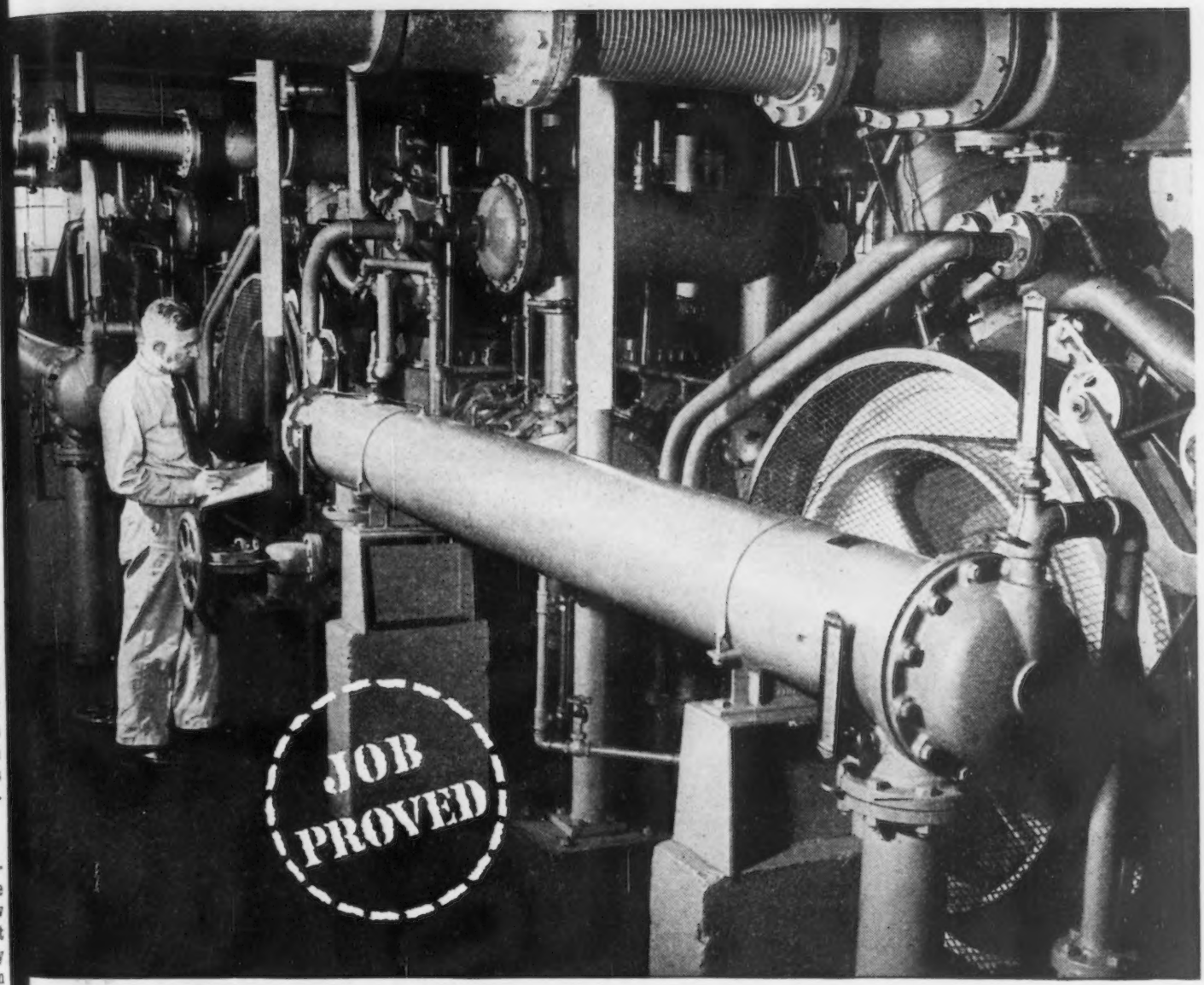
It is further estimated that an increase of 10 million tons of ingot capacity would require 1.5 to 2 million tons of finished steel, while a 15 million ton ingot increase would require 2.25 to 3 million tons of finished steel. In terms of ingots these increases would require an estimated 2.1 to 2.7 million tons and 3.2—4 million tons, respectively.

USING the governmental estimate of $250 per ton as the cost of installing one ton of new capacity, Commerce points out that the cost of 10 million tons capacity would be $2.5 billion and 15 million tons capacity, $3.75 billion.

These estimates are all based on integrated additions, assuming that ingot capacity will be increased by the addition of openhearth and other steelmaking furnaces, that pig iron capacity will be increased, etc.

Commerce further states that part of the increase to both ingot and pig iron capacity could be made with less costly installations than the addition of new furnaces, namely, by the use of oxygen, high top-pressure, and compressed air. Therefore, to the extent to which such processes would be used to increase capacity, steel requirements for capacity additions would be less and installation costs lower than indicated by the Commerce survey.

Compressing Maintenance Problems



SUN COMPRESSOR LUBRICANT...

Keeps Compressors Operating Four Years on 24-Hour-a-Day Schedule

Twenty thousand and ten hours of trouble-free operation were piled up by one unit in a big, industrial plant operating a battery of heavy-duty 400 horsepower compressors. There was no time out except for routine inspections. Sun Oil was used from the very first hour these compressors were installed. When they were finally shut down for thorough inspection, no wear was apparent and no major parts had to be replaced.

Sun "Job Proved" industrial lubricants are making similar impressive records in all kinds of industrial plants, keeping production on an even, round-the-clock basis, holding down maintenance and operating costs. If you have problems concerning the lubrication of compressors, power plants, machine tools or other industrial equipment—remember the Sun Engineer is at your service without obligation on your part. Just phone the nearest Sun office or write Dept. IA-4. . . .

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SUN
SUNOCO
INDUSTRIAL PRODUCTS

Probes Electric Power Needs, Studies Gas Also

Washington

• • • **Surveys of** natural gas and other fuels, with respect to requirements, production and potential capacities, will be launched as soon as possible by the National Security Resources Board.

Two similar studies got under way last week following a meeting of NSRB officials with representatives of the government and representatives of both private and public electric power utilities. Two industrial advisory committees on power are being organized.

These present studies will cover two fields—electric power capacity and requirements from the viewpoint of both normal and emergency operation, and the need and production capacity for heavy power equipment.

Present scheduled increases in installed capacity by the major utility systems through 1951 approximate 14.5 million kw, according to the Federal Power Commission. Present capacity of Class I systems is rated at 49.4 million kw against peak requirements of 47.6 million kw reached last December.

The two surveys will go into present expansion plans to determine their sufficiency for both current and potential needs, whether financial or other assistance (by government) will be required, the probable effect of the 4-year ERP program, and to develop mobilization plans.

Truman Asks Authority For Additional Stockpiling

Washington

• • • **The White House** recently asked Congress to authorize the Treasury to earmark an additional $375 million for contract authorizations for the purchase of critical and strategic materials for stockpiling.

A total of $360 million had already been requested for stockpiling activity next year; the new request brings the total to $735 million. However, only $285 million is expected to be actually spent; the remainder would represent long term contracts for future delivery. The total authorization is expected to be granted.

In the same message, President Truman confirmed Defense Secretary Forrestal's estimates that an additional $3 billion would be needed next year by the Military Establishments, bringing the budget military requtsts to approximately $14 billion.

President Truman said $775 million of this amount would be allotted for aircraft, parts and research; $860 million for maintenance, reactivation and operation of facilities and equipment; $500 billion for procurement planning, prototype and pilot orders, modernization of equipment, and material improvement; $90 million for research and development, etc.; and $775 million for increased personnel and their maintenance.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

Work Stoppages Rise

Washington

• • • **About 200** work stoppages began in February, 25 more than in January, are reported by the Bureau of Labor Statistics of the Labor Dept. About 70,000 workers were involved, BLS said, but only two affected as many as 5000 workers. About 100 stoppages were carried over, bringing to 300 the number of stoppages in effect at one time or another during February. The prewar average was about 180.

5000 Win Cash For Ideas

Pittsburgh

• • • **Some 5000** Westinghouse Eectric Corp. employees were paid more than $105,000 last year for successful production ideas. In all, 20,743 ideas were sent in through the Westinghouse suggestion system in 1947 and 7755 were adopted.

Alexander McLennan, 45-year old repair shop foreman of Cincinnati, was top winner. He drew $5000 for an idea that cut 75 pct off the time required to repair and recondition transformers. Most successful suggestions were those proposing improvements in shop methods, tools, jigs, fixtures and dies.

Record Net Profit

Cleveland

• • • **New record** net profit of $2,903,557 was earned in 1947 by Cleveland Graphite Bronze Co., president Ben F. Hopkins announced in the annual report to stockholders. The profit amounted to $4.32 on each common share and compared with $2,468,876 the previous year, equal to $3.64 a share on present capitalization.

Every Ring a "Ringer" is our motto at Barium. We use highest quality steels, carefully heated and forged by highly skilled craftsmen. The heat-treating and machining operations are performed by experts. Painstaking inspection assures our customers that only the best will arrive at their shipping docks. Whether the application be a high-speed roller bearing race, a massive generator retaining ring, or a shaft spacer, we always insist upon maintaining these high standards of quality.

We forge 'em from 6" in diameter to 80" or larger, weighing many thousands of pounds and in any quantity from a few to large production runs.

We regularly forge and heat-treat quality bearing steels, stainless, alloys, carbon or tool steels.

Remember! If it's a forging . . . you can Buy It From Barium.

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• Survey of West Coast airframe industry reveals production and employment is low and that "preparedness" talk has had no effect yet.

LOS ANGELES—Today, in the face of the opinion expressed by the Congressional Aviation Policy Board to the effect that the maintenance of a healthy and expandable aircraft industry is required for national security, West Coast aircraft plants are at a postwar low in production.

Approximately 46 pct of the nation's total airframe production capacity, figured in units, is concentrated on the West Coast and in terms of weight it is estimated that this area bulids approximately 60 pct of the total.

Approximately 80,000 persons are employed on the West Coast in the aircraft plants and the national airframe employment is reported at approximately 130,000. The airplane and engine industry together employ approximately 165,000 persons nationally. In southern California alone there are approximately 65,000 persons employed in aircraft plants.

In Seattle Boeing Airplane Co., the only other major producer on the coast, now employs more than 18,000 persons.

In spite of the "preparedness" talk the aircraft industry has not as yet received any important new orders. Currently, North American and Boeing are the two most active plants. The former company has quite an extensive contract for military planes which was received before the end of the calendar year 1947. This is reflected by their increased employment which has grown steadily during the past 2 years.

Lockheed and Douglas have both dropped in employment with the former company having recently laid off 900 persons thus reducing its employment rolls by about 5000 in the past year. A similar situation has held at Douglas.

Spokesmen for the aircraft industry say that if orders were to be placed soon for the next fiscal year, an increase in activity would not be apparent for 6 to 12 months. The length of time elapsing between issuance of the contract and actual production depends of course on the type of order received. With volume production orders, some large plants could expand very quickly, but other plants would require more time.

IN the past few months the airframe industry has been momentarily expecting new orders and in anticipation have been enlarging their engineering staff. Major companies are advertising in the daily newspapers for engineers, aerodynamicists, stress analysts, structures engineers, and so forth. Immediately after VJ-Day all plants suffered a considerable loss in engineering personnel. A survey conducted by THE IRON AGE of the principal airframe producers on the coast revealed the following:

Lockheed Aircraft Corp. is now employing approximately 12,000 as compared with approximately 16,000 a year ago. The present backlog of orders amounts to approximately $125 million as compared with approximately $150 million at the same period last year. The company recently announced a $5 million contract for 50 shooting stars, P-80 jet fighter planes. Production schedules call for completion of the P-80B work about November.

The original order for this jet fighter totaled almost 1000 for P-80A's and B's most of the A's have been modified into B's). Lockheed's P2V program, consisting of an order for about 100 planes, will carry into 1949. Meanwhile, 10 to 15 Constellations are being built and work on the huge Constitution is nearing completion. Lockheed has built 144 Constellations of which 124 are in service on 14 different airlines. TWA is expecting delivery of its second Constellation equipped with sleeping facilities for use on New York to Paris trans-Atlantic flights scheduled to start June 20. Lockheed has reported a net loss for 1947 of $2,471,695.

At the three plants of Douglas Aircraft Co. a total of 12,000 are employed which is about one half the number on last year's payroll. Work at present stems from a sizeable Navy contract for the AD-1 Skyraider, with about 125 planes yet to be completed on this contract. At present there are no Army contracts for planes. Douglas has an Army Ordnance contract for missile work. Assembly of DC-6's continues on a small scale. The company has a backlog of orders amounting to approximately $143 million.

Northrop Aircraft Inc. is now employing about 4800. The company recently received an order for 23 "Pioneer" three-engined planes. Work is now under way on an order for 13 "Flying Wing" bombers, and about the same number of B-49's, jet version of the "Flying Wing." In addition, Northrop is handling some subcontract work for Boeing Airplane Co. and carrying on unannounced missile and research work.

EMPLOYEES at North American Aviation Inc., number approximately 20,000. Delivery on a Navy order for about 30 FJ-1 jet fighters is practically completed. Work continues on orders for 250 P-82 Twin Mustangs and 100 B-45 jet bombers. North American, too, is carrying on missile work.

Consolidated Vultee Aircraft Corp., employing about 11,500 in

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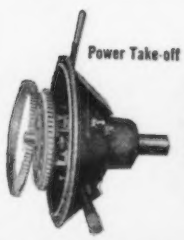
Carrying a precious cargo of human lives—in the small hours—the transcontinental bus driver pilots his speeding mass of streamlined steel toward Pittsburgh. Holding to slick roads and a tight schedule, this highway helmsman must have an experienced hand on the wheel.

Responsibility for transporting human beings cannot be lightly placed. Only an experienced hand . . . one that has traveled roads narrow and broad, day and night . . . can be entrusted with the transport of such fragile goods.

Because of their background of 30 years of experience in mechanical and hydraulic power transmission, Twin Disc Clutch Company engineers bear a heavy load of responsibility, too. Theirs is the responsibility of leadership in a field which has grown with the Twin Disc name.

Twin Disc engineers have met and overcome the most difficult problems in this field . . . have gathered experience, invaluable to you in solving your own power transmission problems. For recommendations based on this experience, consult Twin Disc engineers.

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin
(Hydraulic Division, Rockford, Illinois)



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES
REG. U. S. PAT. OFF.

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

San Diego and a like number in Fort Worth, Texas, is busy at its San Diego plant making the CX-99, Convairliners, and the L-13 liaison plane. The Fort Worth unit is now assembling B-36's.

Ryan Aeronautical, also in San Diego, is employing about 1000. The company is building the Navion personal plane, and doing some research work. There is also activity on a new Navy plane design, but as yet no contract has been received.

Solar Aircraft Co. has unfilled orders totaling approximately $8½ million were placed on the books within the past month. This supplier of components to many airframe and engine manufacturers is concentrating heavily on parts for jet engines.

Boeing Airplane Co. with its 18,000 persons on the Seattle division payroll and 1400 others employed at the Wichita division, today has its highest peace time payroll in its 31-year history. Present backlog is reported to be approximately $240 million including both commercial and military orders.

Last week U. S. Air Force revealed that it had given Boeing another $20 million worth of business when it ordered 27 more of the company's 160,000-lb C-97 Stratofreighters. This ship is the military version of the firm's Stratocruisers, commercial transports now on order for six of the world's major airlines.

This is the second order in recent months to be placed by the Air Force. Last December the AF disclosed a new contract for 82 more B-50 bombers at a cost of from $50 million to $60 million. This order brought the number of B-50's on order to a total of 215; deliveries of these planes, termed by air force officials as the country's "standard long-range bomber," and the "country's strategic air force," was begun several months ago.

Rumors are running strong in the Northwest that Boeing will soon open its Renton plant, near Seattle, now under the WAA, to produce more B-50's or the company's radical new jet bomber, the XB-47 Stratojet, the country's first bomber with swept-back wings. However statements made Air Force officials of Washington indicate that only in the event of war or extreme emergency will the Renton plant be reopened. There seems to be some objection to confining the production of any one bomber to any one plant.

Of course the Wichita plant of Boeing Co. has been reopened for the purpose of modifying and reconverting a number of Boeing B-29 Superfortresses. Boeing has been hiring an additional 1000 employees at Wichita for this program.

IT is reported that in the event Congress appropriates more money for the air force Boeing could turn out large quantities of B-50's but that if the air force wants the XB-47 to be put on a production basis that there would be considerable delay since only two of these multi-jet bombers are on order and the jigs, tooling and all the other preparation work would have to be started from scratch.

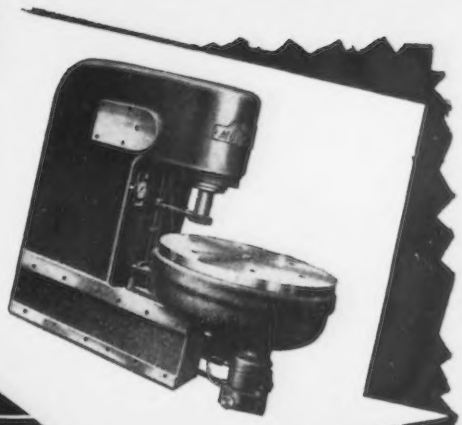
Boeing is also doing development work on ground-to-air-pilotless-aircraft missiles. The company will soon be entering its third year on this hush-hush with the engineering and design work being handled at Seattle and field tests conducted in New Mexico.

In addition to its military work, Boeing now has 55 commercial planes, Stratocruisers, under construction. The first two of these off the production line are currently undergoing CAA type certification tests. These double-deck ships are expected to go into commercial use some time this fall and will carry 80 passengers in pressurized cabins which allow comfortable flight at altitudes up to 30,000 ft.

Present level of production in the airframe industry has not flooded the producers of aluminum sheets with orders as was reported recently by a columnist although producers do report that aircraft manufacturers have been increasing orders moderately for some time. Aluminum sheet producers are well aware of the possibility of increased demand by the aircraft industries but they see no immediate likelihood of allocation being necessary to supply it. However, it is conceded that in the event that Congress appropriates considerably more money for an expanded air force such a program may be essential to prevent bottlenecks, even though sheet production and ingot production is at an all-time high.

SALVAGE FOR DEFENSE: This salvaged molten aluminum not only will help the defense program but it will help to make up for lack of electric power which is holding back peak aluminum output. The ingots are 92 pct pure aluminum and material comes from obsolete Navy planes. More of this type of salvage is expected to be on the way as the country makes ready for a bigger aircraft program.

MULTIPRESS* INCREASES PRODUCTION



Over 100%

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Precision crimping of a thin metal tube to a ceramic bushing presented quite a production problem to a large west coast electrical products manufacturer. Due to variance in part dimensions and part fragility, the operation was formerly run on a manual type press, depending on operator skill for correct pressure. Production by this method was 500 pieces per hour, with a high percentage of rejects. By the MULTIPRESS method, feeding, positioning and ejection of parts is completely automatic, requiring the operator only for loading. *Production was upped to 1100 pieces per hour and rejects greatly reduced—using an unskilled worker!*

*T. M. Reg. U. S. Pat. Off.

DENISON EQUIPMENT in APPLIED HydrOILics

The Denison HydrOILic Index Table was one of the standard accessories used with the MULTIPRESS in achieving this unusual production record. This accessory is especially designed for rapid feeding of parts to the MULTIPRESS ram, for peak production on small and medium sized parts. Since the exact pre-set pressure of the MULTIPRESS remains constant, regardless of part variations, high production can be maintained *without rejects!*

MULTIPRESS used with the Index Table has been boosting production in all industries, often to figures once thought impossible to attain. After you investigate MULTIPRESS with HydrOILic Index Table, you'll see how your own production figures may well do the same! Write today for complete data!

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PERSONALS

° ° °

• **George P. Gradolf,** for many years vice-president and treasurer of the Cincinnati Bickford Tool Co., Cincinnati, has been elected chairman of the board and treasurer. **Ozni E. Schauer,** for 35 years with the company and since 1935 secretary and works manager, is the new president and general manager. **Neil C. Schauer,** for 35 years with the company and since 1925 sales manager, has been elected vice-president and sales manager. **L. Lee Schauer,** with the company 40 years and chief engineer since 1930, has been elected vice-president and chief engineer. **Paul E. Heckel,** with the company for 16 years, has been made secretary, and **C. Charlton Slete,** associated with the company for 40 years, has been appointed assistant treasurer.

• **Leo Reierstad,** formerly sales manager of the Chinese Aluminum Rolling Mills, Shanghai, associated Aluminium Ltd., has joined the staff of the Aluminum Import Corp., in charge of its New York sales office.

• **Victor Walberg** has joined the Coulter Steel & Forge Co., Emeryville, Calif., as a sales engineer. Mr. Walberg was previously with Pacific Metals Co. as commodity manager on stainless steels.

• **William C. Appleby,** assistant to the president of Southern Wheel Div. of American Brake Shoe Co., New York, has retired after 42 years of service with the company. Mr. Appleby served for nearly 23 years in various engineering and supervisory capacities in company plants in the South. He was transferred to New York in 1929 and became assistant to the president of Southern Wheel Div. in 1944.

• **J. A. Butler** has been named treasurer of the Falk Corp., Milwaukee. Formerly assistant treasurer and comptroller, he has been associated with the company for 11 years and assistant treasurer since 1941. **Joseph B. Cibulka,** former assistant comptroller, has been appointed comptroller. He will also continue his duties as office manager. **Richard S. Falk,** assistant to the president, is the new assistant treasurer.

• **F. R. Body** has retired from the sales department of Bethlehem Steel Co., Bethlehem.

• **G. E. Stoltz** has been appointed consulting metal working engineer of the industry engineering department and **W. R. Harris,** the manager of the metal working section, industry engineering department, Westinghouse Electric Corp. Both men will headquarter at East Pittsburgh. Mr. Stoltz joined Westinghouse in 1909 and has been manager of the metal working section since 1938. Mr. Harris joined the corporation in 1937 and entered the industry engineering department in 1938 during which time he has had numerous industry assignments.

FRANK R. PALMER, president, the Carpenter Steel Co.

• **Frank R. Palmer,** former vice-president in charge of sales, has been elected president of the Carpenter Steel Co., Reading, succeeding **J. Heber Parker** who has become chairman of the board. **Ransford V. Mann,** former general sales manager who has been with the company 37 years, has been named vice-president in charge of sales.

• **Frank H. Becherer,** superintendent car department of the Baltimore & Ohio R.R., Baltimore, has retired from active duty with the railroad and is succeeded by **Arthur H. Keys,** assistant superintendent of the car department.

• **Earl W. Stansel** has been appointed assistant to **Frank M. Beauregard,** vice-president in charge of operations of Mullins Mfg. Corp., Salem, Ohio. He has assumed operating direction of the firm's plant in Salem and Warren. Mr. Stansel has formerly been assistant plant manager of Frigidaire in Dayton; factory manager of General Motor's Aeroproducts Div.; factory manager of Nash-Kelvinator; plant manager of Remington-Rand, and works manager of La-Porte Corp.

• **Edward L. Bush,** former assistant purchasing agent for the Murphy Diesel Co., has been appointed purchasing agent of the Michael Yundt Co., Waukesha, Wis.

• **Leonard Highley, Jr.,** who has been associated with Hall Laboratories since 1932, has been returned to the Pittsburgh home office after 9 years' service in Birmingham. **G. Howard Smith,** who joined Hall Laboratories in 1940, has moved from Cincinnati after 4 years there to work in the Birmingham district. **Robert G. Hobek,** who joined the firm in 1939 and served in laboratory work until late 1947, has joined the Hall service engineering staff in Cincinnati.

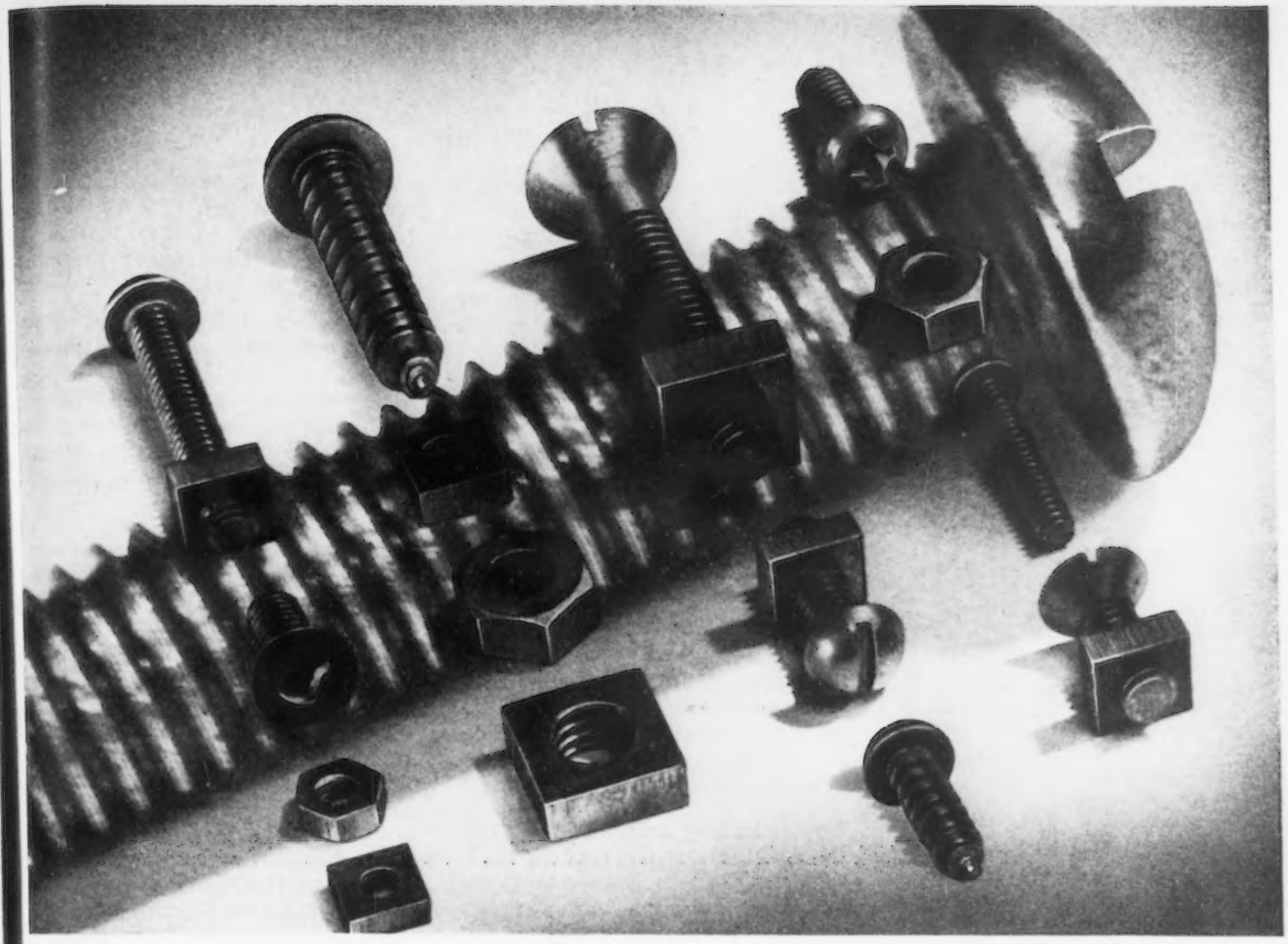
• **Robert C. Wolf** has joined the Horace T. Potts Co. of Philadelphia as a field engineer.

• **Howard P. Meredith** has been appointed works superintendent at American Steel & Wire Co., Rankin Works, Rankin, Pa., succeeding **Charles J. Brown,** who is retiring after 38 years of service. Mr. Meredith started with the company in 1927 and has held various positions. Since 1946 he has been assistant works superintendent at Rankin.

• **Thomas B. Parsons** has been appointed chief works engineer at Cleveland works of Aluminum Co. of America, Pittsburgh. Mr. Parsons joined the company as an industrial engineer at its New Kensington works in 1933. **E. K. Farrand,** who has been with Alcoa since 1928, has been named assistant manager of the warehousing division and will make his headquarters at Pittsburgh.

• **S. G. Sargis** has been named supervisor of raw materials for the Geneva Steel Co., Geneva.

(CONTINUED ON PAGE 142)



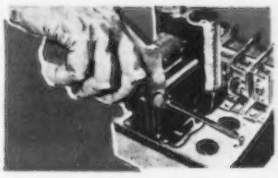
IT'S "t.f.e."

TO CUT THE MAJOR COSTS OF FASTENING

The *major* costs are time and labor. A *minor* cost is initial price.

When you give a man a fastener he can handle with confidence and ease . . . because the dimensions are accurate and uniform, the threads sharp and clean, the heads strong . . . you are saving money. Far more money than you could save through a lower price.

Each time your worker picks up an RB&W bolt, nut, screw or rivet . . . you benefit, cost-wise, from RB&W's know-how, acquired through 103 years of pioneering . . . and from the tremendous investments RB&W has made in modern plants, modern machinery, modern quality control practices.



WORKERS LIKE dependable fasteners headed, threaded and finished to RB&W's quality standards which insure accurate, uniform dimensions; clean, smooth surfaces.

ASSEMBLY SPEED depends on fastener accuracy, obtainable only by controlling raw material. RB&W draws its own wire, using tungsten carbide dies for closest tolerances.

QUALITY CONTROL, with RB&W, is built around proper preparation of materials and equipment. Our constant check, plus conscientious inspection, reduces your inspection.

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TRUE FASTENER ECONOMY
IS THE LOWEST TOTAL OF ALL
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•

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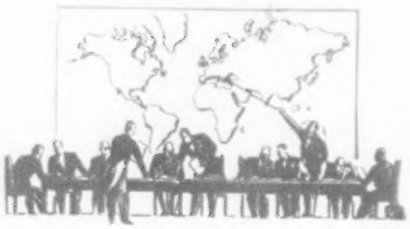
103 Years Making Strong the Things That Make America Strong

European Letter . .

• Canada answers Life magazine's plea for U.S.-Canadian customs union ...Customs union might lead to political union say some Canadians ... Others hold total gain would be small.



MR. HENRY LUCE has made Canada safe for the Commonwealth for some time to come. On Mar. 15 thousands of copies of his pictorial weekly *Life* invaded Canada with an editorial article headed "Customs Union With Canada; Canada needs us and we need Canada in a violently contracting world." Canada was up in arms in an instant.

The cause of *Life's* invitation was Canada's venture into import controls against American imports; the occasion was Britain's participation in the security pact of Western Europe:

> The logic of history is forcing Britain into closer ties with the European continent, and so Canada's future lies with us. . . . A little help may accrue to Canada from the Marshall Plan. . . . But the number and use of these dollars will be closely controlled from Washington. . . . The true long-term answer for Canada is to export more food and manufactures to the United States. . . . Since Canada herself has shown that she cannot fiscally operate in today's world, and since Britain is fiscally impotent, it is up to the United States to act. Doing so we will not only employ Canada's considerable resources but also lighten the impact (*sic*) on our own food and industrial output. The step we should take is complete U.S.-Canadian customs union.

The Canadian papers, particularly the national weeklies, have now replied. The *Financial Post* has objected:

> The tremendous upheaval that would follow such a move might well prove disastrous at this critical time. Where it has been tried in the past, customs union has almost invariably led to political union. That fact will make the suggestion unpalatable to many Canadians.

Talk of customs union just now is impractical and, adds the *Post*, likely to divert attention from Canada's chief hopes for stable export markets which lie in the general revival of world trade and in "an enlightened reform of the U.S. tariff."

THE leading article in *Saturday Night*, under the heading "Life with Uncle Sam," welcomes the neighborly affection that suggests pulling down the walls between the two countries but points out that the matter needs more consideration than the editors of *Life* seem to have given it. If the United States is going to offer a customs union to every country that gets into dollar difficulties the union will take in a lot of countries very quickly. Under a U.S.-Canadian union, all economic control would pass from Ottawa to Washington and complete political union would follow.

Reprinted from The London Economist by special permission.—Ed.

> After a period of adjustment, most Canadians would have a rather higher standard of living . . . but we should be giving up our freedom (for what that is worth in the world today). While we do not think that the offer of *Life* is worse than death, we are not yet quite ready to abandon ourselves to the pleasure of being "kept" by Uncle Sam. We should like Uncle Sam to think it over seriously too.

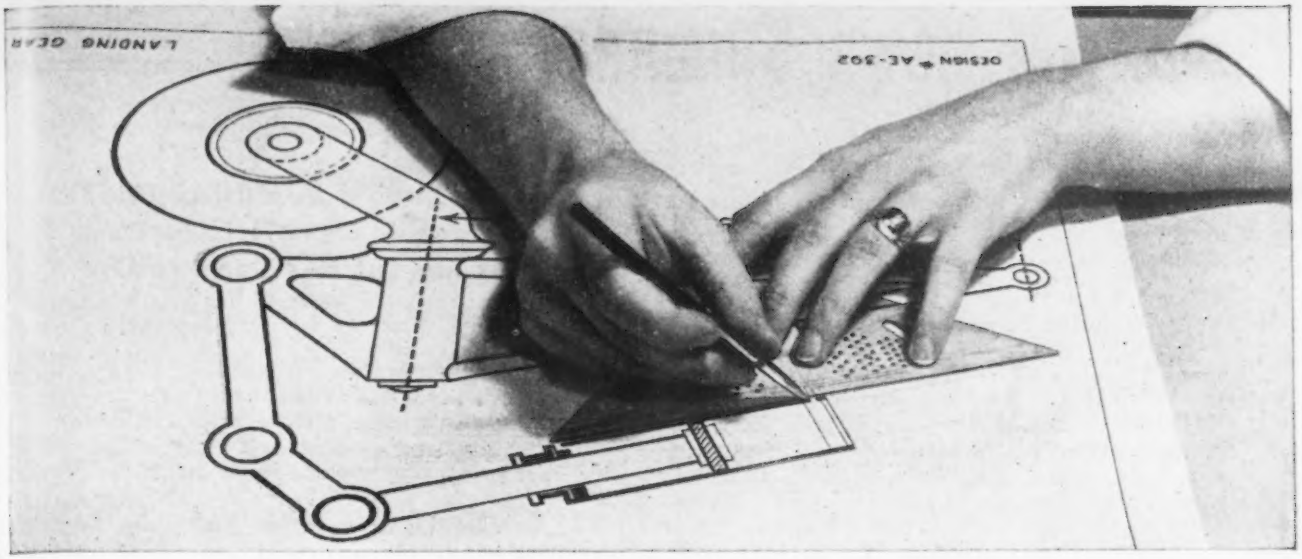
An editorial writer in the latter weekly notes that when, every 40 or 50 years, the question of union with the United States comes up for discussion "our countrymen take leave of their senses." This is happening already. The *Globe* and *Mail* (Toronto) has even managed to persuade itself, under the title "Not on your Life," that:

> For Canada the proposal offers no observable economic advantage. For the United States the profit in the scheme is obvious. Canada's forests and mines could make up the deficiencies beginning to appear in our neighbor's stocks.

IN the long run, most people now living in Canada would unquestionably have a higher standard of living under union, customs or complete, but there would be a very difficult period of adjustment while the economic system, built up in large measure to supply Great Britain and Europe, adjusted itself from east-and-west trade to north-and-south trade. Large areas, built on overseas exports, would stagnate; distributing centers like Winnipeg and Halifax would have to stand up against Chicago and Boston; the main railways running east and west would get into financial difficulties; whole industries such as primary textiles that have been built up behind the tariff would decay; and most exports of manufactures within the empire preference area would immediately stop.

Added to these short-run, but none the less serious, economic objections are political objections. These arise partly from the special structure of Canadian federation. Some provinces are heavily dependent on federal subsidies.

Finally, in any discussion of American union, relations with Great Britain and the Commonwealth will be raised. In some quarters the attitude will be one of blind loyalty. In others it will be affection for family and friends; in others, admiration for British systems of law and government; in others, a recognition that the Commonwealth, loose though it may be, is still a powerful force for freedom and justice throughout the world and that, if Canada left the Commonwealth for the United States, it would subtract far more economic and political power from the former than it would add to the latter.



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Industrial News Summary...

- **Steel Loss 1.4 Million Tons**
- **Shortage to Remain Long Time**
- **Gray Market Has Come to Life**

THE steel industry, the steel consumer and eventually the public will have paid an exhorbitant price for the coal strike. The cost—if the industry, in the next three weeks or so, gets back to prestrike operations—will total about 1,400,000 tons. Added to this may be several more hundred thousand tons loss over the next several months due to dislocations and damage to equipment because of the prolonged mine shut down.

With no steel company holding ample stocks of coal above the ground, the industry is helpless against another mine shutdown if it should occur when present coal contracts run out on June 30. If a walkout comes then—and there is no assurance that it won't—the steel industry will again shut down, but much sooner than it did this time.

Taking the most optimistic viewpoint possible, there is no chance that the steel shortage will be eliminated this year. In a month or two it will be worse than it has been for 2 years. In the next 30 to 60 days the full effects of the coal strike will show up in finished steel shipments. Cuts are already being made in shipments because of the dissipation of semifinished steel stocks which were on hand at steel company plants before the strike.

The pickup in steel mill operations after the miners are back at work and coal is moving to steel plants will be rapid. But so many blast furnaces were taken off and so many open hearths withdrawn that it may be at least 3 more weeks before prestrike output is attained—if then. Operations this week will be at about 76 pct of capacity—21½ points below the rate in the week before the coal strike dropped output.

THE industry will do well if it can prevent a temporary breakdown in steel distribution. It is clear that demands from the European Recovery Plan must be met quickly and will hit the mills sooner than had been expected. Requirements for freight cars are being filled under an allocation plan and have a prior call on available steel. And the beginning of a defense program will mean a greater call on the steel industry before the next few months are passed.

It is now clear to the government, after prodding by the oil and gas industry, that bigger steel shipments for pipe lines and other equipment to enlarge the flow of fuel to the East and Middle West is something that can not be delayed. The oil and gas industry may not get all the steel they have asked for. But they will get more this year than they have been getting since the war ended.

When all these factors are added together it looks bad for the regular demostic steel user. So bad that it won't be long before the trek to Washington for priorities will begin in a big way—it has already started in a small way. Government officials have argued themselves into a position where they see the need for controls. Steel makers, after looking over the whole picture, are scared that at least a big part of the distribution of steel will pass out of their hands before the year is out. And every steel man knows that you can not have half allocation and half free distribution.

This has gray market brokers in a gleeful tizzy. A month ago they were looking around for business. Sales were off, prices had sagged and suckers were hard to find. The coal strike, ERP and the defense talk have combined to breathe new life into what was rapidly becoming a corpse. The resurrection has been so rapid in the past week that sales are picking up and prices are once again at $300 or more a ton for hard-to-get flatrolled steel. And it looks as if the new lease on life will mean happy gray marketeers, higher prices and plenty of sales to manufacturers who can't convince Washington or steel people that they are essential.

STEEL customers who had been supplying steel for the gray market because they received more than they needed and did not want to cancel it are again feeling better. Some had been on the point of turning back some of their steel. The tight situation in supply now means that, either they will need it themselves, or they know they can find a home for it—at a good price.

This also means that companies which previously had been forced to use gray market steel and recently saw signs of getting more mill-priced material can not reduce their prices. There was a chance that with less gray market material used in production many concerns would have been able to reduce prices comensurate with the elimination of the premium steel quotations. Now this won't be done. Not until the present tightness disappears and the gray market fades into the limbo for good. How long this will take is this week anyone's guess.

The scrap market this week was not showing signs of weakness. In the Chicago area the price of heavy melting steel advanced an average of 25¢ a gross ton. This raised THE IRON AGE scrap composite price 8¢ a ton to $40.33 a ton. In other areas the prices were unchanged but the undertone was stronger.

The steel labor talks were adjourned last week until U. S. Steel management looks over the union presentation given them. When the meetings are resumed the corporation is expected to give its answer—then the bargaining will start. It will get rougher as the time draws close to Apr. 30, when, if no agreement is reached, present wage rates apply for another year. But it won't be that simple. Management will have to gage the long term effects of a definite "no" to a wage increase.

• **FURNACE BOUGHT**—Atlas steels, Inc., North American Building, Wilmington, Del., has bought out the Chester, Pa. blast furnace which was operated during the war by Pittsburgh Ferromanganese Co. It is understood that the company is capitalized at $10 million. Rehabilitation of the furnace is expected to require $500,000. The furnace has a rated capacity of 350 tons of pig iron per day, but blowers and other equipment were removed after the war. The furnace was designed to make use of foreign ores and the principal difficulty in reactivating it will be a supply of raw materials. Another difficulty will be to acquire an operating organization.

• **COPPERWELD NET**—Cautioning stockholders to observe that both sales and earnings should be viewed in terms of deflated dollars, S. E. Bramer, president of Copperweld Steel Co., disclosed that net income in 1947 amounted to $1,464,859, equal to $2.85 a common share. This compares with $439,777, or 69 cents a share in 1946. Sales of $53,303,245 in 1947 were more than double the $25,388,894 reported for 1946. The total last year exceeded by $18 million the previous high of $35,396,142 made in 1944.

• **DETROIT ARBITRARY PRICE**—The Detroit arbitrary price of steel was advanced $1 a ton last week by the leading maker in that area. When other firms shipping into Detroit get around to it the increased price of all flatrolled steel delivered into the auto center will be upped the same amount. This will mean that steel producers outside of Detroit will absorb $1 a ton less on shipments to that area. The hike will add about 90¢ to the price of a popular car.

• **SCRAP COMPLAINTS**—Trearusy Dept. last week took steps to insure that war material imported into the U. S. as scrap actually reaches scrap yards. Scrap buyers have complained to the Treasury that some recent imports of junked trucks and other forms of duty-free scrap have become sidetracked after arrival in this country and have turned up for resale in original form. Importers now are required to post bond in the amount of three times the value of the material, and burden of proof that the material actually will be used as scrap rests with the importer.

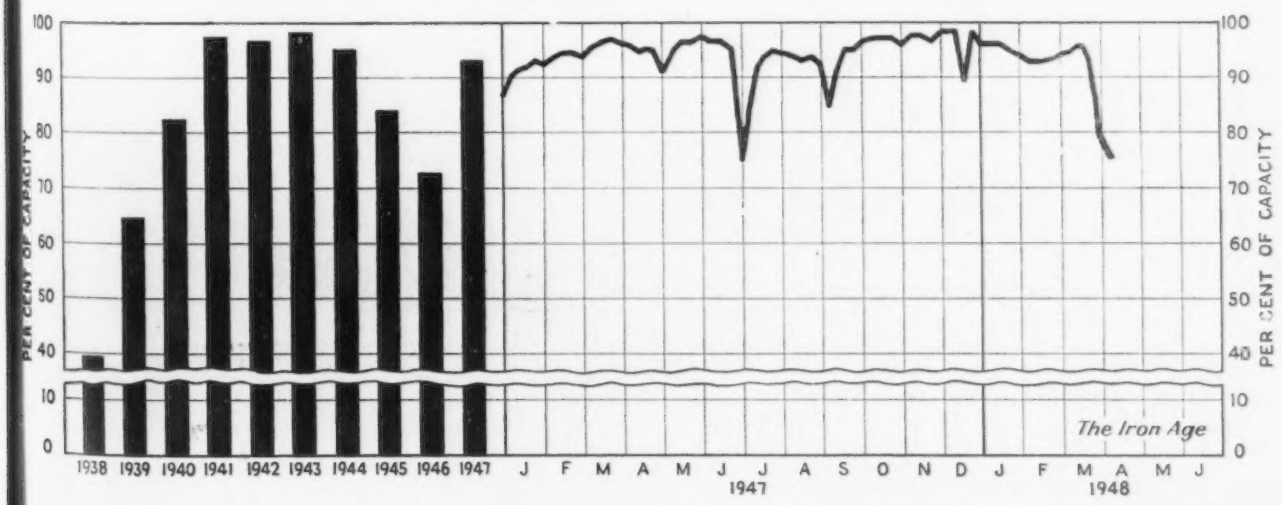
• **AUTO SHUTDOWNS**—If the coal stoppage is continued much longer the three-way squeeze of curtailed transportation, sharply decreased steel output and coal shortage is expected to cut deeply into the production of new cars within a week or 10 days. Another cut of 25 pct in transportation will be particularly effective in the case of Ford and General Motors who ship large quantities of parts knock-down in freight cars. The extent to which such shipments can be diverted to trucks is problematical, since, in many cases, special packing techniques are required to move safely the great quantities of materials required to keep operations going.

• **HARMONY**—Last week Allegheny Ludlum Steel Corp. management attended a dinner given by its employees. Not the apple polishers, but the members of local 1196, United Steelworkers of America. In an unusual move in a steel plant employing 6500, the union invited superintendents, top management and its shop stewards to a dinner at the Brackenridge, Pa. country club. Company and union presidents H. G. Batcheller and Phillip Murray spoke briefly.

• **STIFF INCREASE**—The Stanley Works, Bridgeport, Conn. has announced a $20 a ton base price increase on hot-rolled low carbon strip, and on products fabricated from hot-rolled sheet, plate or bar stock, effective Apr. 5. This brings the Stanley price for hot-rolled strip to $4.40 per 10 lb at Pittsburgh.

• **OPENHEARTH FURNACES**—Steel companies of the United States possess 944 openhearth furnaces, 29 bessemer converters and 217 electric furnaces, according to the American Iron and Steel Institute. Those furnaces have a combined annual capacity of 94,233,460 tons of ingots and steel for castings, highest peacetime capacity to date. Twenty more steel furnaces were operating on Jan. 1, 1948 than a year earlier, and six more blast furnaces were active. At the start of 1947 there were 924 openhearth furnaces included in the industry's total capacity of 91,241,250 net tons. The balance of the industry's steel furnaces comprised 29 bessemer converters and 217 electric furnaces in both years.

Steel Ingot Production by Districts and Per Cent of Capacity



of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
	83.0	94.0	72.5*	77.0	91.0*	55.0*	80.0	44.0*	102.0	79.0	96.0	77.5	98.0*	80.5*
	74.0	87.5	66.0	65.0	91.0	50.0	78.0	41.0	102.0	73.0	83.0	77.5	90.0	76.0**

Fear of Strict Economic Controls Fills The Air With Rumors

Many Controls Are Still In Effect Now But With Some Duplicating Effort

By GENE HARDY
Washington Editor

Washington

• • • **Talk of extended economic** controls in the nation's capital has set in motion a mild case of hysteria in certain segments of industry. This is indicated by correspondence reaching Washington — ranging from reports that the government has taken over specific plants to the placing of huge defense orders with overriding priority.

Control advocates have indicated that steel, lead, copper, zinc, and aluminum are high on the list of any allocation measures that may be asked of Congress. But there are no strict production or allocation controls, affecting a large part of industry, now in operation.

Causing much of the hysteria is the fact that, coupled with the talk of broad economic controls, the Administration is exercising a heterogeneous bunch of controls, voluntary and otherwise, scattered throughout a half dozen agencies. These agencies, along with two defense planning groups, have sponsored more than a score of industry advisory committees. The committees, overlapping in some instances, with meetings at irregular intervals require the attendance of business leaders from all parts of the country. Much of the talk at these meetings concerns economic controls. The above factors should dispel any mystery surrounding the control-psychology now building up.

The controls now exercised include the remnants of the Second War Powers Act, export priorities, voluntary agreements on priority, allocation, and inventory controls, and strict control over all commercial exports. There has been little attempt to consolidate these economic activities, because the President has delegated authority all over the lot. Many of the controls are lodged in the various sub-agencies of the Dept. of Commerce and overlapping in certain activities, such as the collection and analysis of economic data, is not uncommon.

This scattered authority and the building up of duplicating functions makes it quite clear that any immediate return to widespread controls will be in a piecemeal fashion, despite well-intentioned plans of the Munitions Board and National Security Resources Board for speedy and comprehensive industrial mobilization.

The following summary of the emergency controls now exercised by Administration agencies outlines in brief the only powers that have been sanctioned by Congress:

See p. 104 for news of the steel capacity question.—Editor

Office of Materials Distribution, Dept. of Commerce — This small group administers what is left of the Second War Powers Act and possesses the only mandatory powers affecting domestic use of certain raw materials. Its powers are limited to rubber, tin, antimony, and government-owned quinidine. Industry advisory committees covering these products are functioning. An important power exercised by OMD, which has not been used extensively, is the authority to grant export priorities under specified conditions. It is expected that these powers will come into wider use in order to assure the production of commodities for export under the European Recovery Program. These powers expire May 31, 1948, but an extension seems likely.

ERP HEAD; Paul G. Hoffman . . .
The Senate has voiced unanimous approval of President Truman's selection of Paul G. Hoffman, president of the Studebaker Corp., to head the European Recovery Program.

Office of Industry Cooperation, Dept. of Commerce—This office is attempting to work out voluntary agreements for the allocation of scarce materials to so-called key areas of the economy. Established on Jan. 27, it has yet to work out any agreements. Its major accomplishment has been the taking over of the Office of Defense Transportation voluntary freight car program. It can work out allocation plans only if both the producing and recipient industries agree. While its concrete accomplishments have been practically nil to date, OIC has under consideration voluntary agreements covering the following industries Steel, pig iron, farm equipment, freight cars, petroleum equipment, cast iron pressure pipe, cast iron soil pipe, plywood, soda ash and caustic soda, steel prefabricated homes, gypsum board and lath, nitrogen, and steel warehouses. In furtherance of these aims it has established 11 different industry advisory committees, plus a few subcommittees. Its authority expires on Feb. 28, 1949.

Office of Defense Transportation —This agency can seek voluntary agreements for the allocation and use of transportation equipment and facilities. It has not sought any agreements to date. Its powers also expire on Feb. 28, 1949.

Dept. of Interior—Exercises the voluntary agreement authority with respect to fuels. It is planning voluntary measures to conserve petroleum products and, in addition, is

working up a bill of materials for the petroleum industry to be presented to OIC. Industry advisory committees have been set up. As in the case of other voluntary allocations authority, Interior's delegation of power will run out next February.

Dept. of Agriculture—Voluntary agreements affecting agricultural products are handled by this department. One agreement has been worked out. Industry advisory committees are in operation. Authority expires next February.

Office of International Trade, Dept. of Commerce—This agency controls all exports from the United States. Its authority expires on Feb. 28, 1949. A further extension will undoubtedly be granted. OIT says it plans to establish a number of commodity advisory committees.

In addition to these control agencies, the major defense planning agencies, the Munitions Board and the National Security Resources Board, are busy setting up industry advisory committees.

February Construction

Washington

• • • **A total of** $1.1 billion in construction activity, including $959 million in new building previously reported by the Commerce Dept., occurred in February.

OIT Export Quota Of Steel Mill Products Set At 845,150 Tons

Washington

• • • **Office of** International Trade has established a second quarter export quota for steel mill products totaling 845,150 tons. The quota covers products for which specific quantitative limitations have been established, and, according to OIT, includes all presently approved requirements of various special projects abroad of vital interest to the United States.

A breakdown of the second quarter follows (short tons):

Carbon steel ingots, 15,000; carbon steel billets, blooms, and slabs, 55,000; carbon steel sheet bars and tinplate bars, 750; alloy steel ingots, 1,000; steel billets, blooms, and slabs (stainless included), 25,000; steel bars, cold-finished, including nonalloy and alloy, except stainless, 16,900; concrete reinforcing bars, 44,000; iron bars, other steel bars and rods (hot-rolled), containing no alloy, 100,200*; other steel bars and rods (hot-rolled), alloy steel, except stainless, 30,000.

Wire rods, except specialty steel, 10,000; boiler plate, other plates, except fabricated (hot and cold-rolled included) containing no alloy, 107,000; other plates, except fabricated (hot and cold-rolled included) alloy steel, except stainless, 5,000; skelp iron and steel, 500; galvanized sheets, 18,500**; black sheets, ungalvanized (hot and cold-rolled included) containing no alloy, 78,500; black sheets, ungalvanized (hot and cold-rolled included) alloy except stainless, 10,000.

Iron and steel strip, hoop, band, and scroll, cold-rolled, containing no alloy, 13,000; iron and steel strip, hoop, band, and scroll, hot-rolled, containing no alloy, 12,500; terneplate, including long ternes, 1500; structural shapes, except fabricated, 59,000; structural shapes, fabricated except prefabricated houses, 54,000.

Plates, fabricated, punched or shaped, 6200; sheet piling, 13,000; rails, under 60 lb per yd, 6200; relaying rails, 9000; rail joints, splice bars, fish plates and tie plates, 22,000; seamless and welded boiler tubes, 10,000; malleable iron screwed pipe fittings, 150-lb pressure and under, 4800; cast iron pressure pipe and fittings, 9000; welded black and galvanized pipe, wrought iron, 1700.

Welded galvanized pipe, steel, 14,000; iron and stel pipe, n.e.s., 16,000; iron and steel wire, uncoated, 19,000; galvanized wire, 18,0000; barbed wire, 13,000; woven wire fencing, 2900; wire cable and rope, except insulated, 3600; baling wire, black, annealed; coils, cold-finished; musical instrument wire; piano wire; spring wire, bright steel, for musical instruments, 2000.

Nails, shingle; cut; roofing, lead-headed; shingle, 5700; castings and forgings, railway car wheels, except locomotive, railway car axles, without wheels, except locomotive, railway car axles, fitted with wheels, except locomotive, 6000; iron steel forgings, n.e.s. (except railway car wheels, tires, and axles, and horseshoes and mule shoes): containing no alloy, 3700; alloy steel (stainless included), 3000.

* No more than 40 pct of the quota will be licensed for steel bars and rods (hot-rolled) containing no alloy.

** No more than 25 pct of the quota will be licensed for gages 22 and lighter.

National Sets Pipe Record

McKeesport, Pa.

• • • **National Works** of U. S. Steel's National Tube Co. made more steel ingots and shipped more seamless pipe in March than in any previous month of the plant's 63-year history, general superintendent E. G. Price reported.

A new blooming mill production record and high performance by all National Works departments also contributed to make March an all-time record month for the McKeesport plant, Mr. Price declared.

March ingot production of 109,353 tons topped the previous record, set in December, 1947, with an increase of 530 tons. Blooming mill crews rolled ingots into 87,430 tons of blooms—1275 tons over the old high rolled in December, 1947. National Works made these new high bulk production figures pay off in terms customers understand by shipping 6575 more tons of seamless pipe than in any previous month.

Coming Events

Apr. 19 Wire Reinforcement Institute, annual meeting, Edgewater Park, Miss.

Apr. 19-21 American Society of Lubrication Engineers, convention and exhibition, Buffalo.

Apr. 19-23 American Chemical Society, national meeting, Chicago.

Apr. 20 Steel Joist Institute, annual meeting, Edgewater Park, Miss.

Apr. 21 American Iron & Steel Institute Committee on Researches in Reinforced Concrete, annual meeting, Edgewater Park, Miss.

Apr. 22-23 Westinghouse Electric Corp., Machine Tool Forum, Buffalo.

Apr. 22-24 Concrete Reinforcing Steel Institute, annual meeting, Edgewater Park, Miss.

Apr. 26-28 American Supply & Machinery Manufacturers Assn., National Supply & Machinery Distributors Assn., Southern Supply & Machinery Distributors Assn., Triple Mill Supply convention, Atlantic City.

Apr. 26-30 American Management Assn., packaging exposition and conference, Cleveland.

May 3-7 American Foundrymen's Assn., convention and show, Philadelphia.

May 11-12 American Steel Warehouse Assn., annual meeting, Chicago.

May 13-14 American Management Assn., production conference, Chicago.

May 26-27 American Iron & Steel Institute, meeting, New York (restricted to members only).

May 27-29 Society for Experimental Stress Analysis, meeting, Pittsburgh.

June 6-9 American Gear Manufacturers Assn., annual meeting, Hot Springs, Va.

Aircraft Makers Want More Power For Greater Aluminum Output

ERP and Defense Plans Spur Interest; Raw Materials Are No Bottleneck

By JOHN ANTHONY
Eastern Regional Editor

New York

• • • **Frantically studying** the sold out aluminum market in the light of forthcoming orders for military aircraft, airplane manufacturers are calling on the government to begin a power development program and to plan for the allocation of aluminum products.

Domestic power resources, on which aluminum production is dependent to the extent of 8 to 10 kw-hr per lb of aluminum produced, are taxed to their utmost with the current high level of industrial operations, coupled with large requirements for atomic energy. In some areas in the Pacific Northwest there is a great deal of agitation to divert some of the power now going to aluminum reduction plants into higher employment industries long suffering from a power shortage.

Aluminum producers feel that there should be a two-pronged attack on the power problem. The short range program would call for an interconnecting network of transmission lines between power producing areas so that those short (of power) could draw on surplus areas. Such a program would do much to step up aluminum production within a short time. Aluminum producers are reported to be willing to divert an adequate proportion of their current production to transmission cable, provided an appropriate amount of the resultant power could be earmarked for their use.

The National Security Resources Board has two studies under way on the power problem. Capacity and requirements will be covered.—Editor.

The long range power program would call for additional hydroelectric capacity, largely in the Northwest on the Columbia River and in the Northeast in the St. Lawrence Seaway development. Opposition to the latter as a power project is almost non-existent. But the production of generators and turbines for new hydro-electric projects would postpone the development of energy from this source until 1950 at the earliest.

Domestic aluminum production is at the rate of over 2 billion lb per year. The Finletter Committee recommended the construction and maintenance of 70 groups of Army aircraft, which was translated by the Congressional Aviation Policy Board into 111 million lb of airframe production annually by the addition of 14,500 Navy planes. This program would require only something over 80 million lb of aluminum per year. But the current military program contemplates the airborne transportation of large numbers of ground troops and requires the use of light metals for most of their airborne armament.

The aluminum industry needs only more power to step up its production. There is sufficient raw material production, bauxite and alumina. There is adequate ingot plant capacity, although some of the largest have been cannibalized because of power shortages and their high cost of production, those at Maspeth, N. Y. and Torrance, Calif.

There are three idle potlines at Massena, N. Y. adjacent to Alcoa's plant, another three at Riverbank, Calif. and two more at Jones Mills, Ark. If permitted to be returned to service by adequate power developments, these three facilities would produce some 270 million lb of ingots per year. Production of the Aluminum Co. of Canada, is now operating well below its rated capacity of 500,000 tons per year. The Shipshaw power development has reserve capacity adequate to permit the doubling of current production. But only 150 million lb. per year have been imported into the United States, largely from the old plant at Shawinigan Falls.

At the present time, less than 5 pct of the industry's capacity is devoted to aircraft needs, and less than 3 pct to military aircraft requirements. Tonnages required for the preparedness program must be diverted from current civilian consumption until the expanded power program gets under way.

POWER PROJECT: This is a drawing, prepared by the Power Authority of New York State, of the projected controversial St. Lawrence seaway and power project. The project calls for a 2.2 million hp hydroelectric development (center foreground), as well as further improvement of navigable channels.

Industrial Briefs . . .

• ELECTS LEADER — Frank W. Miller, official of the Lehigh Structural Steel Co., Allentown, Pa., has been elected president of the American Hot Dip Galvanizers Assn.

• BUILDING PRESSES—The Baldwin Locomotive Works is building six steam platen presses for the processing of plywood in the new plant of the Compagnie Francaise DuGaban now under construction at Port Gentil, French Equatorial Africa. Two 865-ton presses and four 715-ton presses are under construction at Baldwin's Southwark plant at Eddystone, Pa.

• CHANGES NAME — The Mathieson Alkalo Works, New York, has changed its name to Mathieson Chemical Corp. for the purpose of identifying the company with its increasingly diversified line of products.

• STEEL OFFICE—Fort Duquesne Steel Co., Pittsburgh, processors and distributors of flat-rolled steel products, has appointed Judson H. Scott, 193 Bryan St., Rochester, N. Y., as its district sales representative in Rochester and vicinity.

• AWARDED MEDAL—Marvin J. Udy of Niagara Falls has been awarded the 1948 Jacob F. Schoellkopf Medal of the western New York section of the American Chemical Society for his contributions to the refining and utilization of chromium.

• HEADS PRICE GROUP—Vogel E. Gettier, Willys-Overland market analyst, has accepted the chairmanship of the subcommittee on pricing. Industrial Marketing Committee of the American Marketing Assn. replacing Kemp G. Fuller who resigned.

• OPENS WAREHOUSE — Chase Brass & Copper Co. has opened a new warehouse in Atlanta at 695 Stewart St., SW. Herman H. Herring will be district manager.

• CANADIAN SUBSIDIARY —The Unitcast Corp., Toledo, in cooperation with Canadian associates, has organized a subsidiary, the Canadian Unitcast-Steel, Ltd., who has purchased the steel casting foundry and business of the Canadian Brake Shoe & Foundry Co., Ltd., in Sherbrooke, Quebec. The new company's office will be in Sherbrooke.

• NEVADA ACQUISITION—The $140-million basic magnesium plant at Henderson, Nev., has been sold to the State of Nevada for the sum of $24 million. Certain portions of the plant are subject to recapture under the National Security laws.

• BUYS PLANT — Westinghouse Electric Corp. has purchased a 125,000 sq ft plant at Hahntown near Irwin, Pa., as part of its $132 million expansion and improvement program. The new plant will process mica flakes into tape, fabricated parts and sheets for use in electrical insulation.

• MOVES—The Pyrometer Instrument Co. has moved to their newly completed plant, laboratory and office at Bergenfield, N. J.

• EASTERN WAREHOUSE—The Plomb Tool Co., Los Angeles, has added a warehouse at its Jamestown, N. Y., plant for stocking their complete line.

• MEEHANITE CASTINGS—The Shenango-Penn Mold Co., Dover, Ohio, producer of ferrous and non-ferrous centrifugal castings, is now equipped to cast Meehanite metals by the centrifugal process.

• MORE GREASE — Cities Service Oil Co. has acquired approximately 42 acres of land on the Chicago Sanitary Ship Canal and will immediately begin the construction of a petroleum compound and grease plant.

Will Not Convert Steel, Aluminum Plant Output For War Mobilization

Washington

• • • **Because of** the basic nature of their products, the capacity of the nation's steel, aluminum, general purpose machine tool, and some other manufacturing plants would not be converted for war mobilization, according to the Munitions Board. As a result, overall plant capacity will not be allocated under the present plant survey being conducted by the Board as part of the mobilization planning program.

Some productive capacity in steel and aluminum plants which are known as multiservice suppliers will be allocated, however, and a tentative list has been drawn up. While the list is subject to change, the following producers are currently scheduled to specific capacities or parts of plants allocated: U. S. Steel Corp., Bethlehem Steel Corp., American Rolling Mill Co., Crucible Steel Co., Inland Steel Co., Jones & Laughlin Steel Corp., Kaiser Co., National Steel Corp., Republic Steel Corp., Youngstown Sheet & Tube Co., Western Pipe & Steel Co., Aluminum Co. of America and Permanente Metals Corp.

In the event actual mobilization became necessary, it is indicated, the capacity of such industries would be placed under distribution control of an agency, under the National Security Resources Board, similar to the recent WPB.

However, the Munitions Board will, in conjunction with the NSRB and three military departments, work out detailed plans for steel, aluminum and other metal plant mobilization with an eye to meeting the greatest possible potential requirements.

Four general types of production capacity will be exempt from conversion and allocation under the present survey, the Board says. These are: Production of raw and basic processed materials such as steel, lumber, cement, etc.; food processing except capacity for processing and packaging subsistence items which would likely run short under wartime conditions; production of general purpose machine tools, forging hammers and presses, cutting and some special purpose machine tools, textile and rubber working machinery; and, plant ca-

(CONTINUED ON PAGE 124)

Steel for Automobiles Advanced 34 Pct Between 1940 and 1947

But Increased Use of Steel Upped Total Bill 43 Pct; Car Prices Up 64 Pct

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By GEORGE SULLIVAN
Pittsburgh Regional Editor

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Pittsburgh

• • • **If steel price** increases alone were responsible for automobile price boosts the popular priced car that delivered at Detroit for around $1330 in 1947 would have sold for about $185 less. Between 1940 and 1947 the average Detroit delivered price of Chevrolet, Ford and Plymouth 4-door deluxe sedans rose from about $815 to about $1330. Against this 63 pct increase, the cost of the steel going into a composite average of these three cars rose 34 pct. The amount of steel in this composite car was increased by about 220 lb so that overall steel cost increase was approximately 43 pct. Specifically, $37.50 was added to the steel bill during that period. For a car delivered at a distance from Detroit the price increase is sharper because of substantial freight rate increases during the period.

To find how much automobile manufacturers' steel costs had risen from 1940 to 1947 THE IRON AGE made a study of Detroit delivered steel prices in the types and quantities required for the average popular priced car. No attempt is made here to evaluate the effects of higher labor costs, increased tooling costs, extra federal taxes or any other higher cost factors.

When fabricators refigure costs and find a price increase in order it is not uncommon custom to cast about for a cause. Looking back, the latest steel price boost usually sticks out like a sore thumb. So steel gets the blame more often than not. This study shows that this popular custom is unfounded; that all the blame for consumer goods price increases can not honestly be laid to steel price boosts.

The following table summarizes the results of this study on motor cars. The figure "amount of steel" is the average weight of steel purchased for a composite Chevrolet-Ford-Plymouth 4-door sedan. Actually, the figure used is the shipping weight of this composite car. Those who have made careful studies in this field arrive at a figure within a few percent of shipping weight for the total purchased steel figure. The weight of non-steel material in the car is about equal therefore to the amount of steel scrap generated in production. The fact that this scrap is now worth about twice its 1940 price was not considered.

AVERAGE STEEL COST AND WEIGHT
Composite Chevrolet-Ford-Plymouth 4-Door Sedan

	1947	1940	Increase	Pct Increase
Amount of steel, pounds	3186	2967	219	7.4
Detroit steel cost, ¢ per lb	3.9	2.9	1.0	34
Total steel cost	$124	$86.50	$37.50	43

The average price per pound of finished steel was calculated from average 1940 and 1947 quoted Detroit delivered prices plus average extras. The total cost was arrived at from IRON AGE information on proportions of steel used in typical cars in this price field. Detroit delivered automobile prices include federal tax.

Analysis of steel costs in electric refrigerators shows that percentagewise delivered prices have increased slightly more than steel cost increases. A typical refrigerator that sold for $175 in 1940 contained about $8.50 worth of steel. A comparable unit selling for $230 in 1947 would show a steel cost of $10.75 using the same types and quantities of steel. The steel cost increase was about 26 pct; selling price was about 31 pct higher. In dollars and cents steel cost about $2.25 more, the refrigerator, $55 more.

It is possible, of course, to consider only the price increase in steel alone, assuming that nothing else had moved. It is generally agreed that these would be distorted comparisons without foundation in fact. Such a system would show for instance that even doubling of the price of steel during the period would have added less than $100 to the price of a car, less than $10 to the price of a refrigerator.

Gray Iron Founders Meet at Reading, Pa.

Philadelphia

• • • **A Philadelphia-Reading** management group of Gray Iron Founders' Society was formally organized at a recent meeting held at Reading, Pa.

The group, one of a series of 40 being organized throughout the United States, elected as its chairman, H. P. Good, director, Gray Iron Founders' Society and superintendent, Textile Machine Works, Reading; vice chairman, W. Morley, Olney Foundry Division, Link Belt Co., Philadelphia; and secretary-treasurer, I. J. Rentz, Textile Machine Works.

R. L. Collier, executive vice president, Gray Iron Founders' Society, told the group that if the coal strike is allowed to continue, it will force the closing of a large percentage of the 2500 gray iron foundries scattered throughout the country, which are vitally in need of coke in connection with their operation.

The management group discussed recent price trends in the scrap iron market and problems in connection with the general shortage of pig iron. A quarterly cost accounting clinic was held in conjunction with the meeting.

Redesigns Aerosol Bomb

Pittsburgh

• • • **Aerosol Bomb** prices are being cut 45 pct by Gulf Oil Corp. because the well known heavy steel shell has been replaced by a tinplate container. The bomb can now be put up in a unit reesmbling an ordinary tin can because a new combination of liquid gases (Freon 11 and 12) operate it under lower pressure.

Mobilization Planning

(CONTINUED FROM PAGE 122)

pacity producing certain end items or components having equally wide use for civilian and military purposes.

In this last named category are numerous fabricated products and special industrial machinery. These include nonelectric crucible furnaces and foundry equipment; various types of electric motors, generators and dynamos; roll transport equipment such as locomotive frames, boilers, trucks, and freight car truck assemblies; and varied general equipment such as compressors,, bearings, track and roller chains, cast and forged valves, etc.

Among fabricated metal products not to be converted or allocated at present are wire cloth and screening; bolts, nuts, screws, etc.; electrical and electronic equipment; cutting tools; hand tools, except power driven, such as saws, files, etc.; and some types of plumbing equipment.

The mobiliation and planning survey now under way will cover between 22,000 and 25,000 selected manufacturing plants. More may be included later. And although this number represents only about 25 pct of the nation's manufacturing plants of recognizable size and production, it nevertheless involves a sizable majority of total productive capacity of essential goods.

Its purpose is primarily to find out what essential items each plant could best produce under emergency or wartime conditions and the estimated capacity for such output. The amount of conversion and the time required would also figure in.

Following a study of reports, the Board will allocate or assign each plant as the responsibility of one or more in some cases) of the military services or departments. It will thereafter be the responsibility of that service or agency to make mobilization plans for the plant—along the policy lines of the Munitions Board and NSRB.

Such surveys and planning, says the Board, serves the double purpose of easing peacetime procurement problems and providing a sound basis for mobilization planning. Because war requirements necessarily change with strategic plans, all allocation and production schedules are tentative as well as variable, the Board points out.

Construction Steel . . .

• • • **Fabricated steel awards** in recent weeks included the following:

32,000 Tons, Boston-Chelsea, Mystic River bridge, split 18,000 tons to American Bridge Co., Pittsburgh, and 14,000 tons to Bethlehem Steel Co., Bethlehem.

16,000 Tons, Pierce County, Wash., Tacoma Narrows Bridge, through Director of Highways, Olympia, to Bethlehem Pacific Coast Steel Corp., San Francisco.

1260 Tons, Montezuma, Ind., bridge 2938, State of Indiana, through Robert E. King Co., to Bethlehem Steel Co., Bethlehem.

785 Tons, Trenton, N. J., bridges for route 26, sect. 1A, New Jersey Dept. of Highways, to American Bridge Co., Pittsburgh.

600 Tons, Cedar Rapids, Iowa, Central Iowa Power Corp. powerhouse to Iowa Steel & Iron Co., Cedar Rapids, Iowa.

400 Tons, New Brunswick, N. J., chemistry building for Rutgers University, to Bethlehem Fabricators, Inc., Bethlehem.

335 Tons, New Bridge, Del., laboratory and office building 293, and laboratory building 269, E. I. du Pont de Nemours Co., to Bethlehem Fabricators, Inc., Bethlehem.

290 Tons, Superior, Wis., bridge U-08-5-34 to American Bridge Co., Pittsburgh.

290 Tons, New York, eight-story office and showroom bulding, to Grand Iron Works, Inc., New York.

275 Tons, New Rochelle, N. Y., two-story office building, to Grand Iron Works, Inc., New York.

250 Tons, Fayette County, Ill., bridge section 42F, American bridge previously reported low bidder, has been awarded the contract.

235 Tons, Snyder County, Pa., bridge for Pennsylvania Dept. of Highways, to Fort Pitt Bridge Works, Pittsburgh.

210 Tons, Buffalo, Westinghouse Electric Corp. warehouse, to Bethlehem Steel Co., Bethlehem; John W. Cowper Co., Inc., general contractor.

200 Tons, Cambridge, Mass., manufacturing plant to American Bridge Co., Pittsburgh, through Morton C. Tuttle Co., Boston, engineers.

175 Tons, Chicago, Garden City Envelope Co., building to Wendnagel & Son, Chicago.

170 Tons, Lynn, Mass., plant for Champion Lamp Co. to Lehigh Structural Steel Co., Allentown, Pa.

160 Tons, New Bridge, Del., laboratory building 262, E. I. du Pont de Nemours Co., to Bethlehem Fabricators, Inc., Bethlehem.

135 Tons, Manoa, Pa., Bethany Presbyterian Church, to Lehigh Structural Steel Co., Allentown, Pa.

135 Tons, Scranton, Iowa, bridge section ERS-8-1 to Pittsburgh-Des Moines Steel Co., Des Moines.

130 Tons, Forest Hills, N. Y., six-story apartment house and garage, to Grand Iron Works, Inc., New York.

130 Tons, Decorah, Iowa, Dry Run flood control project to American Bridge Co., Pittsburgh.

110 Tons, Tomahawk, Wis., power house for the National Container Corp. to the Northeastern Boiler & Welding Co.

110 Tons, Green Bay, Wis., building for the Wisconsin Public Service Co., to Wisconsin Bridge & Iron Co., Milwaukee.

85 Tons, East Orange, N. J., one-story office building, to Grand Iron Works, Inc., New York.

• • • **Fabricated steel inquiries** in recent weeks included the following:

1095 Tons, Pennsylvania, Vine St. bridge, City of Philadelphia through Pennsylvania Dept. of Highways, due Apr. 30.

925 Tons, Delaware County, Pa., bridge on route R-762 (2B-1), Pennsylvania Dept. of Highways, general contract due on Apr. 23.

800 Tons, Sault Ste Marie, Mich., hydroelectric power plant, through U. S. Engineers Detroit office, bids close Apr. 21.

• • • **Reinforcing bar awards** in recent weeks included the following:

3000 Tons, Chicago, Dorchester Arms apartment building to Ceco Steel Products Co., Chicago.

950 Tons, Pierce County, Wash., Tacoma Narrows Bridge, through Director of Highways, Olympia, to Bethlehem Pacific Coast Steel Corp., San Francisco.

680 Tons, Chicago, Beverly-Calumet sewer project to Ceco Steel Products Co., Chicago.

550 Tons, Spokane, Wash., Veterans Administration Hospital, through Robert E. McKee, General Contractor, to Judson Pacific-Murphy Corp., San Francisco.

270 Tons, Red Wing, Minn., power house for Northern States Power Co., to Paper Calmenson Co., St. Paul, Minn.

120 Tons, Oak Park, Ill., faculty building for Fenwick High School, to William R. Goss, contractor.

• • • **Reinforcing bar inquiries** in recent weeks included the following:

1000 Tons, Sault Ste. Marie, Mich., hydroelectric power plant through U. S. Engineers, Detroit office, bids close Apr. 21.

370 Tons, Los Angeles, overcrossing and undercrossing on Hollywood Parkway at Bonnie Brae St. and at Beaudray Ave., California Div. of Highways, Los Angeles, bids to May 6.

215 Tons, San Luis Obispo County, Calif., bridge across San Luis Obispo Creek near Pismo Beach, California Div. of Highways, Sacramento, bids to Apr. 21.

185 Tons, Santa Rosa, Calif., highway construction and bridges, California Div. of Highways, Sacramento, bids to May 12.

115 Tons, Los Angeles, overcrossing on Arroyo Seco Parkway at Alpine St., California Div. of Highways, Los Angeles, bids to May 6.

110 Tons, Fremont County, Col., construction on state highway No. 6 between Canon City and Penrose, State Highway Engineer, Denver, bids to Apr. 23.

Orders 3000 Coal Cars To Cost $12,250,000

Cleveland

• • • **Chesapeake & Ohio Railway Co.** has placed orders for 3000 70-ton hopper coal cars at approximate cost of $12,250,000, bringing the total number of freight cars on order to 9850 at total estimated cost of $40 million.

The order was divided between American Car & Foundry Co., which will build 2000 cars at its Huntington, W. Va. shop, and the Bethlehem Steel Co., which will build 1000 cars at its Johnstown, Pa. plant. Deliveries from both plants are expected to start in Dec. 1948.

Five other companies were represented in competitive bidding on the new equipment. These included Pullman Standard Car Mfg. Co., Ralston Steel Car Co., Greenville Steel Car Co., Pressed Car Co., and General American Transportation Corp.

Weekly Gallup Polls . . .

Southerners Strongly Oppose Truman's Civil Rights Program

Princeton, N. J.

• • • **Southern voters** who have heard about President Truman's civil rights program are overwhelmingly opposed to it, and there is a general feeling throughout the South that the present administration in Washington has not dealt fairly with their section, according to George Gallup, director, American Institute of Public Opinion.

How far the anti-Truman revolt will progress in the South remains to be seen. In February polls by the institute found that the number of Southern whites favoring his nomination had dropped from 73 pct to 60 pct. It was on Feb. 2 that President Truman announced his civil rights program which irritated many Southerners by recommending a feedral anti-lynch law, action against poll taxes, a federal FEPC law and other civil rights measures.

The poll of the South was conducted among a cross-section of the white voting population. It was found that 68 pct had heard or read about the civil rights program. These people were asked:

"How do you feel about Truman's civil rights program? Do you think Congress should or should not pass the program as a whole?"

The vote:

	Pct
Should	6
Should not	56
No opinion	6
	68
Had not heard of program	32

In summary, more than nine times as many Southern whites familiar with the program oppose it as favor it.

The Southern voters were also asked:

"Do you think the present administration in Washington has dealt fairly, in general, with the South?"

Their vote:

	Pct
Yes	34
No	51
No opinion	15

Opposition Says Interference With States Rights Without Full Understanding of South

The main reasons given by those dissatisfied were that the administration is trying to bring equality between whites and negroes, that Washington has been attempting to interfere with states rights and that the civil rights program was proposed without a full understanding of the situation in the South.

Outside the South the opinion of the country on the civil rights program is favorable, among those who have heard about it. The proportion who are aware that such a program was proposed is 55 pct, and their attitudes follow:

Outside South

	Pct
Congress should pass program	21
Should not	15
No opinion	19
	55
Had not heard of program	45

50 YEARS AGO

THE IRON AGE, *April 14, 1898*

• "Any scribbler thinks he can write about the iron trade. It seems to be a particularly inviting subject for those who feel they must keep the public informed. From the country editor, who regards every iron manufacturer as a monopolist, to the man who poses as a great political economist, not a writer for the public eye can be found who is not prepared to discuss at large any phase of the iron question. Ordinarily, the blunders committed by these necessarily half-informed individuals are not worthy of notice, but occasionally it happens that flagrant instances occur which should not be permitted to pass without notice ———."

• **"The increasing use of storage batteries for electric light in railway stations, street cars and motor carriages, has led the General electric Co. to develop a special type of meter which will show the amount of energy available in the battery."**

• "Recently, two new companies have been organized in New York to do business in connection with the calcium carbide industry at Niagara Falls. One is to be known as the Union Carbide Co. and has a capital stock of $50,000. The second will be known as the Carbide Lighting Co."

• **"The Langelier Mfg. Co. of Providence, R. I., has built a new machine for tapering tubing by spinning, which is claimed to be ahead of the swaging process. It tapers any length up to 30 in. in a single operation, leaving the tubing uniform in thickness the whole length of the taper."**

• "Cheapening of the production of liquified air within recent years and the remarkable results achieved therewith, must impress everyone who has followed up the subject or witnessed experiments with the great possibilities of liquefied air in industry."

MACHINE TOOLS

. . . News and Market Activities

Bright Future Seen as Hoffman Becomes ERP Administrator

• • • **Appointment of** Paul G. Hoffman, president of Studebaker Corp., as administrator of the European Recovery Program, appears to be not only a departure from the usual Simon-Pure political appointment in an election year, but a good break for the machine tool industry.

To qualified observers, Mr. Hoffman's antecedents suggest that the tooling needs of the ERP countries will receive enlightened attention, and that machine tool builders can look for the reported $122 million in new firm orders under ERP with a new degree of certainty.

Mr. Hoffman has been an outspoken proponent of machine tools, not only as the instruments of mass production, but as a social force. In an article appearing in THE IRON AGE, Mar. 11, 1948, Mr. Hoffman stated, "Machines, because of their enormous productivity, cut costs. As costs are cut, prices decline and more people can buy the things produced. More jobs come into being." From this it would appear that machine tool builders are in good hands.

Realistic plans for the 2-week short course in sales engineering at Cornell University next summer have been rounded into shape. The course, which will be conducted July 12-23 by Cornell's School of Mechanical Engineering in cooperation with NMTBA and the American Machine Tool Distributors' Assn., is probably the first offered by a college to emphasize the sale of capital equipment in American industry.

The course will bring 53 industrial sales representatives to the campus for lectures and discussions of means of "selling" service to their customers. Enrollment has been completed.

Prof. Harry J. Loberg, Cornell's Dept. of Industrial Engineering, will head a teaching staff made up of machine tool experts from the sales, purchasing and engineering fields, advertising and public relations, and education.

Machine Tool Builders Certain To Receive $122 Million In New Firm Orders

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Representatives from the machine tool industry on the teaching staff will include: E. C. Adams, vice-president, Van Norman Co., Springfield, Mass.; L. W. Scott Alter, president - general manager, American Tool Works Co.; K. Swan E. Bergstrom, vice-president, Cincinnati Milling Machine Co.; B. N. Brockman, vice-president and sales manager, R. K. LeBlond Machine Tool Co.; and Charles Clark, assistant to sales manager, Cincinnati Milling Machine Co., all of Cincinnati.

Also Frank L. Armstrong, vice-president, Marshall & Huschart Machinery Co., Chicago; Reed M. Andress, second vice-president in charge of sales, Barnes Drill Co., Rockford, Ill.; E. Payson Blanchard, director of sales, Bullard Co., Bridgeport, Conn.

Also Frederick A. Brechter, vice-president, VanDyck Churchill Co., New York; A. G. Bryant, vice-president, Cleereman Machine Tool Co., Green Bay, Wis.; C. Denson Day, sales manager, machinery Div., Norton Co., Worcester; R. L. Giebel, R. L. Giebel, Inc., New York; George Habicht, Jr., president and treasurer, Marshall & Huschart Machinery Co., Chicago.

Also J. C. Hebert, sales manager, Jones & Lamson Machine Co., Springfield, Vt.; Arthur B. Kettle, vice-president and manager, Machinery Div., Austin-Hastings Co., Cambridge, Mass.; Earl S. MacDonald, sales manager, Syracuse Supply Co., Syracuse; J. F. Miller, sales manager, Ex-Cell-O Corp., Machine Tool and Cutting Tool Dept., Detroit.

Also E. K. Morgan, vice-president in charge of sales, Giddings & Lewis Machine Tool Co., Fond Du Lac, Wis.; H. E. Oatis, partner, J. F. Owens Machinery Co., Syracuse; Thomas A. Rudel, president and Treasurer, Rudel Machinery Co., New York; E. J. Seifreat, president, Seifreat-Elstad Machinery Co., Dayton; H. L. Tigges, executive vice-president, Baker Bros., Inc., Toledo; R. A. Vidinghoff, vice-president, Swind Machinery Co., Philadelphia; Edward W. Voss, Voss Machinery Co., Pittsburgh; and Daniel R. Weedon, assistant manager, Blanchard Machine Co., Cambridge, Mass.

Representatives from Industry will include: August Bohlender, vice-president, Warner Gear Co., Muncie, Ind.; Allen L. Billingsley, president, Fuller & Smith & Ross, Cleveland; Harry Ehrlicher, vice-president in charge of purchasing, General Electric Co., Schenectady; James E. Sheen, public relations counselor, New York; Robert Haynes, manager, mechanical department, Spicer Mfg. Co., Toledo; R. T. Hurley, Ford Motor Co., Detroit; O. A. Jackson, vice-president, Continental Illinois National Bank & Trust Co., Chicago; Bernard Lester, consultant, New York; William J. Peets, chief engineer, Singer Mfg. Co., New York; and J. R. Weaver, Westinghouse Electric Corp., Springfield, Mass.

Asks More Tagging

Washington

• • • **The Budget Bureau** has been asked to approve the tagging of another 90,000 units including some production equipment in addition to JANMAT'S present authorization of 92,000 tools. Approval of this request would mean eventual JANMAT stocks of 182,000 units. Approval is expected shortly. WAA officials told THE IRON AGE that even if this additional request is approved about 20,000 surplus tools will still remain to be sold.

SCRAP

Openhearth Grades Continue Activity

New York

• • • **Openhearth scrap** was still moving very, very fast this week. The big mills are taking all they can get and inventories are generally up. Some of the small mills, particularly in the midwest, have reached or nearly reached their saturation point and are beginning to leave the market, but the big mills are the volume business, and so the market continues to be firm.

The mills' ingot rate will show about a 10 pct drop this week, but no effect on the scrap demand is reflected in that cutback. Some outfits are using comparatively heavy scrap charges in an effort to maintain capacity and conserve coke. And those mills which have decided against that action are anxious nonetheless to build up their stockpiles, hence the sustained demand.

The railroads have still not been forced to drastically curtail their car offerings and only a few scrap moves have been delayed on that cause so far.

Foundry operations continued to slacken with operations at most of the smaller units dropping well below the 50 pct of capacity level. Prices held well on foundry grades, however, even though shipments were off slightly for the second straight week. The situation is a balance in which pent-up demand is still making itself felt even though operations are consuming very little material.

How long the market firmness can continue in the event that the miners remain out is difficult to tell. Another 2 weeks of reduced operations, in fact of further cutbacks, and the present volume of shipments should put most mill inventories in the well-fixed class. If that should happen, some mills would probably still be willing to buy even if it required establishment of additional storage space. There would be a definite assault on formula prices, however, and although it is unlikely that the miners will still be out in a month, that period of time would almost certainly break the market.

PITTSBURGH—Price changes during the past week were limited to a 50¢ advance in rails, both scrap and 2-ft lengths. Otherwise prices were listless though there was no sign of weakness in cast grades. At least one mill in the district was keeping operations a little higher than would otherwise be possible by pulling in scrap from the Southwest. Shipments have been excellent and some producers have been able to build up inventories during the past month. For the present it was believed there are enough unfilled orders on hand to hold prices steady. There simply isn't enough material available to cause the results of the coal strike to make any heavy dent in scrap prices.

•

CHICAGO—The market firmed up last week. Brokers were offering higher prices some at $41.00 a gross ton on openhearth items. Railroad lists closed higher and dealers report scrap hard to buy. No contracts have been cancelled with some expiration dates long past. On the other hand the mills report heavy shipments, growing inventories and show as yet no tendency to buy at prices higher than they have paid in past weeks. Under these conditions it is difficult to assess the effect of the coal strike on scrap. On the surface the coal troubles have not yet greatly influenced the market.

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CLEVELAND—Openhearth grades are very strong in the Valley. To all appearances, openhearth material is moving freely at formula prices, but actually the market is threatening to go up as a result of the curtailment of blast furnace operations and customer buying at more-than-formula prices. Earmarking has reached a point where the bulk of the material moving can be classed in the earmarked category, but the undercurrents in the market are being supplemented by major consumers reaching out for long-distance tonnage, and there are rumors of purchases by such consumers at prices as high as $5 over the formula. Foundries are not showing much interest in anything but coke at the moment.

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PHILADELPHIA — Mills are gaining ground on their scrap inventories as heavier shipments during last week made their effect felt. So far none of the eastern Pennsylvania mills except Bethlehem has been required to reduce its operations, although some have been required to use anthracite and other carbonizing agents with a heavy scrap charge. There were no changes in prices of heavy melting or turnings grades. Foundry cast grades dropped because of the shortage of coke and a feeling of weakness in the market. The price of heavy breakable cast was increased $1. Despite the improving inventories of the mills, the scrap market here continues firm.

DETROIT — Unconfirmed reports that the scrap price formula has been broken through have been given wide circulation here this week. At the same time, large mill buyers indicate that shipments have been at the highest level for many months. Informed sources do not see any substantial change in the local market if it should become necessary to place further general restrictions on rail shipments since, it is argued, scrap will probably continue to move under preference. The cast iron market is definitely easier this week, as coke shortages plus substantially improved collections have relieved a considerable amount of the pressure on these grades.

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BIRMINGHAM—Although prices remain firm, the shortage of coal continues to cut scrap purchases in this market. Dealer supplies have increased. Striking coal miners have been reported to be hauling scrap to yards.

•

BUFFALO—Foundry scrap weakened as coke supplies dwindled last week. Cast iron lost $2 to $3 with cupola dropping back to $60 to $62, and scrap rails and three-foot rails both slumped. Other foundry items were easy but unchanged in price.

•

NEW YORK—Cast shipments dropped off slightly again and the market was somewhat soft in those items. Openhearth material continues to move very fast. The general steadiness in prices continues. Some rumors of breaks in the formula were being circulated, but they remained strictly in the rumor stage and were not substantiated by any spokesmen.

•

BOSTON—Shipments are spotty with majority of brokers doing comparatively little. Further easing of breakable cast prices is noted, but those for machinery cast have steadied. To date the coal stoppage has not been a real market factor but if continued will be. Yard stocks are accumulating, but by no means are excessive.

•

CINCINNATI—There has been no change in the market here. Demand for openhearth grades is strong, but foundries are moving with noticeable caution. Railroad specialties sold in this area last week brought more money on the basis of Pittsburgh delivery, but had no effect on the going prices in Cincinnati. A strong price undertone, largely the result of extra-curricular buying, is keeping the market in a disturbed state, and rumors of a price increase with the end of the coal strike are in the wind.

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ST. LOUIS—Steel mills in the St. Louis industrial district are taking tonnage at unchanged price formula rates for April and are getting more than they are consuming. The coal strike has had no effect on the mills yet. Foundry items are up slightly.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
RR. hvy. melting	41.00 to 41.50
No. 2 hvy. melting	40.00 to 40.50
RR. scrap rails	55.50 to 56.50
Rails 2 ft and under	62.50 to 63.50
No. 1 comp'd bundles	40.00 to 40.50
Hand bdld. new shts	40.00 to 40.50
Hvy. axle turn.	41.50 to 42.00
Hvy. steel forge turn	41.50 to 42.00
Mach. shop turn.	35.50 to 36.00
Shoveling turn.	38.50 to 39.00
Mixed bor. and turn.	35.50 to 36.00
Cast iron boring	38.00 to 38.50
No. 1 cupola cast.	63.00 to 65.00
Hvy. breakable cast.	52.00 to 53.00
Malleable	77.00 to 79.00
RR. knuck. and coup.	54.00 to 55.00
RR. coil springs	54.00 to 55.00
RR. leaf springs	54.00 to 55.00
Rolled steel wheels	54.00 to 55.00
Low phos.	47.00 to 47.50

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.00 to $39.50
No. 2 hvy. melting	39.00 to 39.50
No. 1 bundles	39.00 to 39.50
No. 2 dealers' bundles	39.00 to 39.50
Bundled mach. shop turn.	37.00 to 37.50
Galv. bundles	34.00 to 34.50
Mach. shop turn.	36.00 to 36.50
Short shov. turn.	35.00 to 35.50
Cast iron borings	34.00 to 34.50
Mix. borings & turn.	33.50 to 34.50
Low phos. hvy. forge	44.00 to 48.00
Low phos. plates	42.50 to 45.00
No. 1 RR. hvy. melt.	41.75 to 43.50
Rerolling rails	52.00 to 54.00
Miscellaneous rails	50.00 to 52.00
Angles & splice bars	52.00 to 53.00
Locomotive tires, cut	54.00 to 55.00
Cut bolster & side frames	49.00 to 51.00
Standard stl. car axles	58.00 to 59.00
No. 3 steel wheels	51.00 to 52.00
Couplers & knuckles	51.00 to 52.00
Rails, 2 ft and under	55.00 to 57.00
Malleable	76.00 to 78.00
No. 1 mach. cast	73.00 to 75.00
No. 1 agricul. cast	61.00 to 65.00
Heavy breakable cast.	51.00 to 52.00
RR. grate bars	59.00 to 61.00
Cast iron brake shoes	58.00 to 60.00
Cast iron carwheels	58.00 to 60.00

CINCINNATI

Per gross ton delivered to consumer:

No 1 hvy. melting	$38.50 to $39.50
No 2 hvy. melting	38.50 to 39.50
No 1 bundles	38.50 to 39.50
No 2 bundles	38.50 to 39.50
Mach. shop turn.	33.00 to 33.50
Shoveling turn.	35.00 to 35.50
Cast iron borings	32.50 to 33.00
Mixed bor. & turn.	32.50 to 33.00
Low phos., plate	46.00 to 48.00
No 1 cupola cast	63.00 to 64.00
Hvy. breakable cast.	53.00 to 54.00
Rails 18 in. & under	59.00 to 60.00
Rails random length	51.00 to 52.00
Drop broken	66.00 to 68.00

BOSTON

Dealers' buying prices, per gross ton, f.o.b. Boston

No. 1 hvy. melting	$31.65 to $31.90
No. 2 hvy. melting	31.65 to 31.90
Nos. 1 and 2 bundles	31.65 to 31.90
Busheling	31.65 to 31.90
Shoveling turn.	.... 28.90
Machine shop trun.	.... 26.90
Mixed bor. & turn.	.... 26.90
Cl'n cast. chem. bor.	36.00 to 37.00
No. 1 machinery cast.	55.00 to 58.00
No. 2 machinery cast	55.00 to 58.00
Heavy breakable cast.	50.00 to 52.00
Stove plate	53.00 to 55.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	.... $35.50
No. 2 hvy. melting	.... 35.50
No. 1 bundles	.... 35.50
New busheling	.... 35.50
Flashings	.... 35.50
Mach. shop turn.	$29.00 to 29.50
Shoveling turn.	30.00 to 30.50
Cast iron borings	30.00 to 30.50
Mixed bor. & turn.	28.50 to 29.00
Low phos. plate	39.50 to 40.50
No. 1 cupola cast.	60.00 to 62.00
Heavy breakable cast.	52.00 to 56.00
Stove plate	52.00 to 55.00
Automotive cast.	62.00 to 65.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	41.00 to 42.00
No. 2 bundles	38.00 to 39.00
Mach. shop turn.	33.50 to 34.50
Shoveling turn.	33.50 to 34.50
Mixed bor. & turn.	33.50 to 34.50
Clean cast chemical bor.	40.00 to 42.00
No. 1 machinery cast	65.00 to 66.00
No. 1 mixed yard cast	62.00 to 63.00
Hvy. breakable cast.	60.00 to 61.00
Clean auto cast.	62.00 to 63.00
Hvy. axle forge turn.	42.00 to 43.00
Low phos. plate	45.00 to 46.00
Low phos. punchings	45.00 to 46.00
Low phos. bundles	43.50 to 44.50
RR. steel wheels	52.00 to 53.00
RR. coil springs	52.00 to 53.00
RR. malleable	72.00 to 75.00
Cast iron carwheels	66.00 to 68.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$41.00 to $42.00
No. 2 hvy. melting	37.50 to 38.50
Bundled sheets	37.50 to 38.50
Mach. shop turn.	33.00 to 33.50
Locomotive tires, uncut	46.00 to 48.00
Mis. std. sec. rails	48.00 to 50.00
Steel angle bars	53.00 to 54.00
Steel angle bars	57.00 to 58.00
Rails 3 ft and under	53.00 to 55.00
RR. steel springs	48.00 to 50.00
Steel car axles	51.00 to 52.00
Grate bars	58.00 to 60.00
Brake shoes	58.00 to 60.00
Malleable	71.00 to 72.00
Cast iron car wheels	58.00 to 60.00
No. 1 machinery cast	64.00 to 65.00
Hvy. breakable cast.	59.00 to 60.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$37.50 to $38.50
No. 2 hvy. melting	37.50 to 38.50
No. 2 bundles	37.50 to 38.50
No. 1 busheling	37.50 to 38.50
Long turnings	25.00 to 26.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	26.00 to 27.00
Bar crops and plate	42.50 to 43.50
Structural and plate	42.50 to 43.50
No. 1 cupola cast.	60.00 to 65.00
Stove plate	55.00 to 58.00
No. 1 RR. hvy. melt.	37.50 to 38.50
Steel axles	38.00 to 39.00
Scrap rails	44.00 to 45.00
Rerolling rails	52.00 to 54.00
Angles & splice bars	47.50 to 50.00
Rails 3 ft & under	52.00 to 56.00
Cast iron carwheels	48.00 to 50.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$40.00 to $40.50
No. 2 hvy. melting	40.00 to 40.50
Mach. shop turn.	35.00 to 35.50
Short shov. turn.	37.00 to 37.50
Cast iron borings	36.00 to 36.50
Low phos.	45.00 to 45.50

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	.... $34.50
No. 2 hvy. melting	.... 34.50
No. 2 bundles	.... 34.50
Mach. shop turn.	$29.00 to 29.50
Mixed bor. & turn.	29.00 to 29.50
Shoveling turn.	31.00 to 32.00
No. 1 cupola cast.	57.00 to 58.00
Clean auto cast.	57.00 to 58.00
Hvy. breakable cast.	54.00 to 55.00
Charging box cast.	54.00 to 55.00
Stove plate	51.00 to 52.00
Unstrp. motor blks.	50.00 to 51.00
Cl'n chem. cast bor.	34.50 to 35.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.75 to $44.00
No. 2 hvy. melting	.... 39.75
No. 1 bundles	.... 39.75
No. 2 bundles	.... 39.75
No. 1 busheling	.... 39.75
Mach. shop turn.	.... 34.75
Shoveling turn.	.... 36.75
Cast iron borings	.... 35.75
Mixed bor. & turn.	.... 34.75
Mixed cupola cast.	60.00 to 62.00
Charging box cast.	54.00 to 55.00
Stove plate	58.00 to 60.00
Clean auto cast.	60.00 to 62.00
RR. malleable	70.00 to 75.00
Small indl. malleable	47.00 to 49.00
Low phos. plate	44.75 to 46.00
Scrap rails	50.00 to 52.00
Rails 3 ft & under	57.00 to 58.00
RR. steel wheels	51.00 to 52.00
Cast iron carwheels	51.00 to 52.00
RR. coil & leaf spgs.	51.00 to 52.00
RR. knuckles & coup.	51.00 to 52.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$39.50 to $40.00
No. 2 hvy. melting	39.50 to 40.00
No. 1 bundles	39.50 to 40.00
No. 1 busheling	39.50 to 40.00
Drop forge flashings	39.50 to 40.00
Mach. shop turn.	34.50 to 35.00
Shoveling turn.	35.50 to 36.00
Steel axle turn.	39.50 to 40.00
Cast iron borings	35.50 to 36.00
Mixed bor. & turn.	35.50 to 36.00
Low phos.	44.50 to 45.00
No. 1 machinery cast.	65.00 to 70.00
Malleable	75.00 to 77.00
RR. cast.	70.00 to 73.00
Railroad grate bars	60.00 to 62.00
Stove plate	60.00 to 62.00
RR. hvy. melting	40.00 to 40.50
Rails 3 ft & under	60.00 to 61.00
Rails 18 in. & under	61.00 to 62.00

SAN FRANCISCO

Per gross ton f.o.b. shipping point:

No. 1 hvy. melting	.... $25.00
No. 2 hvy. melting	.... 25.00
No. 2 bales	.... 25.00

Per gross ton delivered to consumer:

No. 3 bales	.... $19.50
Mach. shop turn.	.... 16.00
Elec. furn. 1 ft under	$32.00 to 34.00
No. 1 cupola cast.	.... 40.00
RR. hvy. melting	.... 28.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting	.... $25.50
No. 2 hvy. melting	.... 25.50
No. 1 bales	.... 25.50
No. 2 bales	.... 25.50
No. 3 bales	.... 19.50
Mach. shop turn.	.... 17.50
No. 1 cupola cast.	$40.00 to 43.00
RR. hvy. melting	.... 26.50

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	.... $26.00
Elec. furn. 1 ft and under	.... 30.00
No. 1 cupola cast.	40.00 to 42.00
RR. hvy. melting	.... 30.00

HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point.

Heavy melting	$22.00*
No. 1 bundles	22.00*
No. 2 bundles	21.50*
Mechanical bundles	20.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.00*
Bushelings, new fact, prep'd.	21.00*
Bushelings, new fact, unprep'd.	16.00*
Short steel turnings	17.00*
No. 1 cast	$42.00 to 46.00
No. 2 cast	35.00 to 37.00

*Ceiling Price.

NONFERROUS METALS

. . . News and Market Activities

Lead

• • • **The advance of** 2½¢ per lb in the price of lead which occurred on Apr. 5 has so far done nothing to relieve the domestic shortage. Although the opinion has been expressed by some sources that the higher price might service to bring about larger imports and higher domestic production, others admit that previous high prices for lead should have developed maximum tonnage production here and abroad. Actually, the higher price level is an outgrowth of the competition among consuming nations for a larger share of the world lead supply. St. Joseph Lead Co. raised its prices on learning that the British Ministry of Supply had raised its buying prices. There is speculation in the trade as to whether the British will raise their prices again to meet the current domestic price level.

Now there are reports of consumers having bought secondary lead as high as 19½¢ per lb, a 2¢ premium over the primary metal price. Recalling that the recent price increase was due to the need for assuring a continuation of import tonnages at world prices inflated because of premium buying, some producers are wondering whether a continuation of buying at premiums above the domestic market won't have a similar inflationary effect. On the other hand, the higher price level may reduce consumption for some applications.

At week end, the strikes in some lead mines in Mexico continued in effect. Members of the industry have been summoned to Washington in the latter part of the month to discuss with Munitions Board officials an accelerated stockpiling program. How a stockpiling program could be superimposed on a critically short domestic market is difficult to understand and would necessitate allocations and probably price control measures.

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Zinc

• • • **The zinc market** has grown increasingly tight and consumers are unable to obtain their full requirements of any grade. Despite the recent increase in the price of lead, producers see no reason to expect any immediate increase in zinc prices. Imports are reported to be coming in freely and the Joplin ore market has apparently been stabilized at the recently increased level. Shipments from the Joplin district are rising and are now above 3500 tons per week, an indication that ore producers are apparently satisfied with the present concentrate price of $78 per ton. There is still some metal in the Metals Reserve stockpile available to consumers who are unable to obtain enough metal from the regular sources. But past experiences of some consumers indicate that government zinc is not easily obtainable.

Production and shipments of slab zinc rose in March from the February low point according to statistics from the American Zinc Institute. Production reached 73,209 short tons, representing a daily average production of 2362 tons, the highest since June 1947. Domestic shipments were 64,241 tons, only some 350 tons below the peak in January. Stock at the end of the period declined by 3000 tons to 45,229, but unfilled orders declined by approximately 10,600 tons to 61,610 tons.

Nonferrous Metals Prices

	Apr. 7	Apr. 8	Apr. 9	Apr.10	Apr. 12	Apr. 13
Copper, electro, Conn.	21.50	21.50	21.50	21.50	21.50	21.50
Copper, Lake, Conn.	21.625	21.625	21.625	21.625	21.625	21.625
Tin, Straits, New York	94.00	94.00	94.00	94.00	94.00	94.00
Zinc, East St. Louis	12.00	12.00	12.00	12.00	12.00	12.00
Lead, St. Louis	17.30	17.30	17.30	17.30	17.30	17.30

Explain Reynolds Extrusion Pricing

Louisville, Ky.

• • • **The recently announced** Reynolds Metals Co. method for pricing aluminum extrusions is described in a statement by D. P. Reynolds, vice-president. In discussing the new method of pricing Reynolds bases the new method on the cost factors involved in producing extrusions, including overhead on equipment, press operating costs, straightening, heat treatment, inspection and packing costs.

Under the Reynolds system, a formula is employed which gives adequate recognition to the effect of complexity in producing the shape. Prices are grouped into five classifications according to the difficulty of manufacture. To determine into which classification a part falls, a factor "d" is found by multiplying the circumscribed circle diameter in inches, by the square of the perimeter of the shape in inches, divided by double the cross-sectional area of the shape in inches.

This figure is then used in a table along with the circumscribed circle diameter to determine into which of the five difficulty classifications the part falls. While the system is applicable to all types of extrusions, prices being published at this time cover solid extrusions only.

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Scrap Metals Prices Up

New York

• • • **The increase** in the price of lead has been reflected in new prices for lead and lead bearing scrap grades. There had been some anticipation of a lead increase in recent weeks and the current rise therefore does not amount to the full 2½¢ increase. Soft scrap lead is quoted at 14½¢ to 15¢ per lb; dry battery plates at 8¾¢ to 9¢. There are also corresponding increases in type metals, based on a smelting charge of $40 a ton. Ingot makers are in the market for composition brass and in some cases have raised their buying prices.

Primary Metals

(Cents per lb. unless otherwise noted)

Aluminum, 99+%, 10,000 lb, f.o.b shipping point, freight allowed.... 15.00
Aluminum pig, f.o.b. shipping point 14.00
Antimony, American, Laredo, Tex... 33.00
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be.....$20.50
Beryllium aluminum 5% Be, dollars per lb contained Be.....$40.00
Cadmium, del'd $1.75
Cobalt, 97-99% (per lb).....$1.65 to $1.72
Copper electro, Conn. Valley..... 21.50
Copper, lake, Conn. Valley.....21.625
Gold, U. S. Treas., dollars per oz...$35.00
Indium, 99.8%, dollars per troy oz... $2.25
Iridium, dollars per troy oz...$105 to $115
Lead, St. Louis 17.30
Lead, New York 17.50
Magnesium, 99.8+%, f.o.b. Freeport, Tex. 20.50
Magnesium, sticks, carlots..... 34.50
Mercury, dollars per 76-lb flask, f.o.b. New York.....$76.50 to $77
Nickel, electro, f.o.b. New York.... 36.56
Palladium, dollars per troy oz.....$24.00
Platinum, dollars per troy oz...$86 to $89
Silver, New York, cents per oz.....74.625
Tin, Grade A, New York..... 94.00
Zinc, East St. Louis..... 12.00
Zinc, New York 12.61
Zirconium copper, 6 pct Zr, per lb contained Zr. $8.75

Remelted Metals

Brass Ingot

(Cents per lb, in carloads)

85-5-5-5 ingot
No. 115 ..... 19.00–19.25
No. 120 ..... 18.50–18.75
No. 123 ..... 18.00–18.25
80-10-10 ingot
No. 305 ..... 24.25
No. 315 ..... 21.75
88-10-2 ingot
No. 210 ..... 30.00
No. 215 ..... 28.00
No. 245 ..... 21.75–22.75
Yellow ingot
No. 405 ..... 15.00–16.00
Manganese bronze
No. 421 ..... 18.00

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys
0.30 copper, max. 18.25-19.00
0.60 copper, max. 18.00-18.75
Piston alloys (No. 122 type).. 17.25-17.50
No. 12 alum. (No. 2 grade)... 17.00-17.25
108 alloy 17.25-17.75
195 alloy 17.50-18.00
AXS-679 ..... 17.25-17.75
Steel deoxidizing aluminum, notch-bar granulated or shot
Grade 1—95 pct-95½ pct..... 17.25-17.75
Grade 2—92 pct-95 pct..... 16.75-17.00
Grade 3—90 pct-92 pct..... 16.25-16.75
Grade 4—85 pct-90 pct..... 15.75-16.25

Electroplating Supplies

Anodes

(Cents per lb, f.o.b. shipping point in 500 lb lots)

Copper, frt. allowed
Cast, oval, 15 in. or longer..... 37⅝
Electrodeposited 32⅝
Rolled, oval, straight, delivered... 33.09
Brass, 80-20, frt. allowed
Cast, oval, 15 in. or longer..... 33⅜
Zinc, cast, 99.99 ..... 20.50
Nickel 99 pct plus, frt. allowed
Cast 51
Rolled, depolarized 52
Silver 999 fine
Rolled, 1000 oz lots per troy oz... 67¼

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum..... 43.00
Copper sulfate, 99.5, crystals, bbls.. 11.50
Nickel salts, single, 425 lb bbls. frt. allowed 14.50
Silver cyanide, 100 oz. lots, per oz. 54.00
Sodium cyanide, 96 pct domestic, 100 lb drums 15.00
Zinc cyanide, 100 lb drums..... 34.00
Zinc sulfate, 89 pct, granules, bbls, frt. allowed 7.75

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb., f.o.b. shipping point, freight allowed.)

Flat Sheet: 0.188 in., 2S, 3S, 24¢; 4S, 61S-O, 25.8¢; 52S, 27.7¢; 24S-O, 24S-OAL, 26.7¢; 75S-O, 75S-OAL, 32.7¢. **0.081 in.:** 2S, 3S, 25¢; 4S, 61S-O, 27.1¢; 52S, 29¢; 24S-O, 24S-OAL, 27.7¢; 75S-O, 75S-OAL, 34.3¢. **0.032 in.:** 2S, 3S, 26.4¢; 4S, 61S-O, 30.1¢; 52S, 32.6¢; 24S-O, 24S-OAL, 34.2¢; 75S-O, 75S-OAL, 43.1¢.

Plate: ¼ in. and heavier; 2S, 3S, 21.2¢; 4S-F, 23.2¢; 52S, 24.2¢; 61S-O, 23.8¢; 24S-F,24S-FAL, 24.2¢; 75S, 75S-AL, 30.5¢.

Extruded Solid Shapes: Shape factors **1 to 4;** 31¢ to 59¢; **11 to 13,** 31.9¢ to 69c; **23 to 25,** 33.4c to 90¢; **35 to 37,** 40.8¢ to $1.25; **47 to 49,** 58.7¢ to $1.84.

Extruded Round Rod, Square, Hex, Octagonal Bar: ¼ in. and over, 27¢ to 38¢; ½ to ¾ in., 28¢ to 40.5¢; ⅝ to ½ in., 29c to 43c; ¼ to ⅜ in., 30¢ to 46.5¢; 7/16 to 5/32 in., 32.5¢ to 53.5¢; 9/64 to 5/32 in., 35.5¢ to 62¢.

Rolled Rod: 1.064 to 4.5 in., 2S, 3S, 30¢ to 26.5¢; Cold-finished rod, 0.375 to 3.5 in., 2S, 3S, 32¢ to 28¢.

Screw Machine Stock: Drawn, 1/32 to 1⅛ in., 11S-T3, 34¢ to 45¢; cold-finished, ⅜ to 1½ in., 11S-T3, 33¢ to 31¢; rolled, 1 7/16 to 3 in., 11S-T3, 31¢ to 28.5¢.

Drawn Wire: coiled, 0.051 to 0.374 in.; 2S, 33¢ to 24¢ 52S, 40.5c to 29c; 56S, 42.5¢ to 34.5¢; 17S-T4, 46¢ to 31¢; 61S-T4, 41c to 30.5c; 75S-T6, 66¢ to 46¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed. Base quantity 30,000 lb.)

Sheet and Plate: Ma. FSa. ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58c-60c; 10, 59c-61c; 12, 63-65c; 14, 69c-74c; 16, 76c-81c; 18, 84c-89c 20, 96c-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Round Rod: M, diam., in., ¼ to ⅜, 47¢; ½ to ¾, 45¢; 1¼ to 2½, 43.5¢; 3½ to 5, 42.5¢. Other alloys higher.

Square, Hexagonal Bar: M, size across flats, in., ¼ to ⅜, 52.5¢; ½ to ¾, 47.5¢; 1¼ to 2½, 45¢; 3½ to 5, 44¢. Other alloys higher.

Solid Shapes, Rectangles: M, form factors, 1 to 4, 46¢; 11 to 13, 49¢; 20 to 22, 51.5¢; 29 to 31, 59.5¢; 38 to 40, 75.5¢; 47 to 49, 98¢. Other alloys higher.

Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.21; 5/16 to ⅜, $1.12; ⅜ to 7/16, 97¢; 0.058 to 0.064, 7/16 to ½, 89¢; ½ to ⅝, 81¢; 0.065 to 0.082, ⅝ to ¾, 76¢; ¾ to 1, 72¢; 0.083 to 0.108, 1 to 2, 68¢; 0.165 to 0.219, 2 to 3, 59¢; 3 to 4, 57¢. Other alloys higher.

Nickel and Monel

(Cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	54	43
No. 35 sheets		41
Strip, cold-rolled	60	44
Rod		
Hot-rolled	50	39
Cold-drawn	55	44
Angles, hot-rolled	50	39
Plates	52	41
Seamless tubes	83	71
Shot and blocks		31

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheets
Copper	33.53	....	33.68
Copper, hot-rolled	....	30.03	....
Copper, drawn	....	31.03	....
Low brass	34.36*	31.39	31.70
Yellow brass	32.92*	29.85	30.16
Red brass	34.89*	31.92	32.23
Naval brass	30.28	29.03	34.97
Leaded brass	28.64	24.69	....
Commercial bronze	35.68*	32.96	33.27
Manganese bronze	33.87	32.37	38.47
Phosphor bronze, 5 pct	53.95*	52.95	52.70
Muntz metal	29.80	28.55	32.99
Everdur, Herculoy, Olympic, etc.	37.24	37.50	38.56
Nickel silver, 10 pct.	41.80	42.68	40.54
5 pct	....	....	38.98
Architectural bronze	28.61	....	....

*Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add 1¢ per lb for shipments of 15,000 lb or more.)

	Heavy	Turnings
Copper	19⅛	18⅜
Yellow brass	15⅝	14¾
Red brass	17½	16¾
Commercial bronze	17⅝	16⅞
Manganese bronze	15¼	14⅜
Leaded brass rod ends	15¾	....

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery.)

No. 1 copper, wire.....18.50–18.75
No. 2 copper, wire.....17.50–17.75
Light copper 16.50–16.75
Refinery brass 16.50–16.75*
*Dry copper content.

Ingot Makers' Scrap

(Cents per pound, carload lots, delivered to producer.)

No. 1 copper, wire.....17.50–17.75
No. 2 copper, wire 16.50–16.75
Light copper 15.50–15.75
No. 1 composition 14.50–14.75
No. 1 comp. turnings 14.00–14.25
Rolled brass 11.00–11.25
Brass pipe 11.50–11.75
Radiators 11.50–11.75
Heavy yellow brass 10.50–10.75
Aluminum
Mixed old cast 9.75
Mixed old clips 9.50
Mixed turnings 8.75
Pots & pans 10.00
Low copper 10.50–10.75

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound.)

Copper and Brass

No. 1 heavy copper and wire.. 16¼—16⅝
No. 2 heavy copper and wire.. 15¼—15⅝
Light copper ..... 14 —14½
Auto radiators (unsweated)... 9⅜—10¼
No. 1 composition ..... 12½—13
No. 1 composition turnings.... 12 —12½
Clean red car boxes..... 9½—10
Cocks and faucets ..... 9¾—10¼
Mixed heavy yellow brass..... 7¾— 8¼
Old rolled brass ..... 9¼— 9⅝
Brass pipe ..... 9⅜—10¼
New soft brass clippings..... 12 —12½
Brass rod ends ..... 9¾—10¼
No. 1 brass rod turnings..... 9¼— 9⅝

Aluminum

Alum. pistons with struts.... 4½— 5
Aluminum crankcases ..... 7 — 7½
2S aluminum clippings ..... 9 — 9½
Old sheet & utensils ..... 7 — 7½
Dry borings and turnings..... 2½— 3
Misc. cast aluminum ..... 6½— 7
Dural clips (24S) ..... 6 — 6½

Zinc

New zinc clippings ..... 8 — 8½
Old zinc ..... 5½— 5⅝
Zinc routings ..... 3 — 3½
Old die cast scrap..... 4 — 4½

Nickel and Monel

Pure nickel clippings ..... 16 —17
Clean nickel turnings ..... 12½—13
Nickel anodes ..... 16 —17
Nickel rod ends ..... 16 —17
New Monel clippings ..... 12 —13
Clean Monel turnings ..... 7 — 8
Old sheet Monel ..... 10 —10½
Old Monel castings ..... 7½— 8
Inconel clippings ..... 8 — 8½
Nickel silver clippings, mixed 8 — 8½
Nickel silver turnings, mixed 6½— 7

Lead

Soft scrap lead ..... 14½—15
Battery plates (dry) ..... 8¾— 9

Magnesium Alloys

Segregated solids ..... 7½— 8
Castings ..... 4½— 5½

Miscellaneous

Block tin ..... 75 —77
No. 1 pewter ..... 60 —62
No. 1 auto babbitt ..... 45 —47
Mixed common babbitt ..... 14¼—14⅝
Solder joints ..... 17¼—17⅝
Siphon tops ..... 45 —47
Small foundry type ..... 17½—18
Monotype ..... 16¼—16⅝
Lino. and stereotype ..... 15½—15⅝
Electrotype ..... 12½—13
New type shell cuttings..... 14½—15
Hand picked type shells..... 6½— 7
Lino and stereo dross..... 8 — 8½
Electro dross ..... 6 — 6½

Comparison of Prices . .

Advances over past week in Heavy Type, declines in *Italics*. Prices are f.o.b. major basing points. The various basing points for finished and semifinished steel are listed in the detailed price tables.

Flat-Rolled Steel: (cents per pound)	Apr. 13, 1948	Apr. 6, 1948	Mar. 16, 1948	Apr. 15, 1947
Hot-rolled sheets	2.80	2.80	2.80	2.50
Cold-rolled sheets	3.55	3.55	3.55	3.20
Galvanized sheets (10 ga.)	3.95	3.95	3.95	3.55
Hot-rolled strip	2.80	2.80	2.80	2.50
Cold-rolled strip	3.55	3.55	3.55	3.20
Plates	2.95	2.95	2.95	2.65
Plates wrought iron	7.25	7.25	7.25	5.95
Stain's c-r strip (No. 302)	30.50	30.50	30.50	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes.	$6.80	$6.80	$6.80	$5.75
Tinplate, electro (0.50 lb)	6.00	6.00	6.00	5.05
Special coated mfg. ternes	5.90	5.90	5.90	4.90
Bars and Shapes: (cents per pound)				
Merchant bars	2.90	2.90	2.90	2.60
Cold-finished bars	3.55	3.55	3.55	3.20
Alloy bars	3.30	3.30	3.30	3.05
Structural shapes	2.80	2.80	2.80	2.50
Stainless bars (No. 302)	26.00	26.00	26.00	26.00
Wrought iron bars	8.65	8.65	8.65	6.15
Wire: (cents per pound)				
Bright wire	3.55	3.55	3.55	3.30
Rails: (dollars per 100 lb)				
Heavy rails	$2.75	$2.75	$2.75	$2.50
Light rails	3.10	3.10	3.10	2.85
Semifinished Steel: (dollars per gross ton)				
Rerolling billets	$45.00†	$45.00†	$45.00†	$42.00
Slabs, rerolling	45.00†	45.00†	45.00†	42.00
Forging billets	54.00†	54.00†	54.00†	50.00
Alloy blooms, billets, slabs	66.00	66.00	66.00	61.00
Wire Rods and Skelp: (cents per pound)				
Wire rods	2.80	2.80	2.80	2.55
Skelp	2.90	2.90	2.90	2.35

†Net ton

Pig Iron: (per gross ton)	Apr. 13, 1948	Apr. 6, 1948	Mar. 16, 1948	Apr. 15, 1947
No. 2, foundry, Phila.	$44.61	$44.61	$44.61	$36.51
No. 2, Valley furnace	39.50	39.50	39.50	33.50
No. 2, Southern Cin'ti	43.28	43.28	43.28	34.75
No. 2, Birmingham	37.38	37.38	37.38	29.88
No. 2, foundry, Chicago†	39.00	39.00	39.00	33.00
Basic del'd Philadelphia	44.11	44.11	44.11	36.92
Basic, Valley furnace	39.00	39.00	39.00	33.00
Malleable, Chicago†	39.50	39.50	39.50	33.50
Malleable, Valley	39.50	39.50	39.50	33.50
Charcoal, Chicago	62.46	62.46	62.46	45.99
Ferromanganese‡	145.00	145.00	145.00	135.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ For carlots at seaboard.

Scrap: (per gross ton)				
Heavy melt'g steel, P'gh.	$40.25	$40.25	$40.25	$37.50
Heavy mlt'g steel, Phila.	41.50	41.50	40.00	33.50
Heavy melt'g steel, Ch'go	39.25	39.00	39.00	33.25
No. 1, hy. comp. sh't, Det.	35.50	35.50	35.50	30.75
Low phos. Young'n.	45.25	45.25	45.25	39.25
No. 1, cast, Pittsburgh	64.00	64.00	61.00	46.00
No. 1, cast, Philadelphia	65.50	65.50	65.50	48.00
No. 1, cast, Chicago	74.00	70.50	69.00	43.50
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$12.50	$12.50	$12.50	$9.00
Foundry coke, prompt	14.00	14.00	14.00	10.25
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro. Conn.	21.50	21.50	21.50	21.50
Copper, Lake Conn.	21.625	21.625	21.625	21.625
Tin, Grade A, New York	94.00	94.00	94.00	80.00
Zinc, East St. Louis	12.00	12.00	12.00	10.50
Lead, St. Louis	17.30	17.30	14.80	14.80
Aluminum, virgin	15.00	15.00	15.00	15.00
Nickel, electrolytic	36.56	36.56	36.56	37.67
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	33.00	33.00	33.00	33.00

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Apr. 13, 1948	3.23940¢ per lb.	$40.11 per gross ton	$40.33 per gross ton
One week ago	3.23940¢ per lb.	$40.11 per gross ton	$40.25 per gross ton
One month ago	3.23940¢ per lb.	$40.29 per gross ton	$39.75 per gross ton
One year ago	2.86354¢ per lb.	$33.15 per gross ton	$34.75 per gross ton

	HIGH	LOW
1948	3.23940¢ Feb. 17	3.19411¢ Jan. 6
1947	3.19411¢ Oct. 7	2.87118¢ Jan. 7
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1
1945	2.44104¢ Oct. 2	2.38444¢ Jan. 2
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5
1943	2.29176¢	2.29176¢
1942	2.28249¢	2.28249¢
1941	2.43078¢	2.43078¢
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16
1939	2.35367¢ Jan. 3	2.26689¢ May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2
1933	1.95578¢ Oct. 3	1.75836¢ May 2
1932	1.89196¢ July 5	1.83901¢ Mar. 1
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29
1930	2.25488¢ Jan. 7	1.97319¢ Dec. 9
1929	2.31773¢ May 28	2.26498¢ Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

	HIGH	LOW
1948	$40.37 Feb. 17	$39.58 Jan. 6
1947	37.98 Dec. 30	30.14 Jan. 7
1946	30.14 Dec. 10	25.37 Jan. 1
1945	25.37 Oct. 23	23.61 Jan. 2
1944	$23.61	$23.61
1943	23.61	23.61
1942	23.61	23.61
1941	$23.61 Mar. 20	$23.45 Jan. 2
1940	23.45 Dec. 23	22.61 Jan. 2
1939	22.61 Sept. 19	20.61 Sept. 12
1938	23.25 June 21	19.61 July 6
1937	23.25 Mar. 9	20.25 Feb. 16
1936	19.74 Nov. 24	18.73 Aug. 11
1935	18.84 Nov. 5	17.83 May 14
1934	17.90 May 1	16.90 Jan. 27
1933	16.90 Dec. 5	13.56 Jan. 3
1932	14.81 Jan. 5	13.56 Dec. 6
1931	15.90 Jan. 6	14.79 Dec. 15
1930	18.21 Jan. 7	15.90 Dec. 16
1929	18.71 May 14	18.21 Dec. 17

Based on averages for basic iron at valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
1948	$41.83 Jan. 29	$39.75 Mar. 9
1947	42.58 Oct. 28	29.50 May 20
1946	31.17 Dec. 24	19.17 Jan. 1
1945	19.17 Jan. 2	18.92 May 22
1944	19.17 Jan. 11	15.76 Oct. 24
1943	$19.17	$19.17
1942	19.17	19.17
1941	$22.00 Jan. 7	$19.17 Apr. 10
1940	21.83 Dec. 30	16.04 Apr. 9
1939	22.50 Oct. 3	14.08 May 16
1938	15.00 Nov. 22	11.00 June 7
1937	21.92 Mar. 30	12.67 June 9
1936	17.75 Dec. 21	12.67 June 8
1935	13.42 Dec. 10	10.33 Apr. 29
1934	13.00 Mar. 13	9.50 Sept. 25
1933	12.25 Aug. 8	6.75 Jan. 3
1932	8.50 Jan. 12	6.43 July 5
1931	11.33 Jan. 6	8.50 Dec. 29
1930	15.00 Feb. 18	11.25 Dec. 9
1929	17.58 Jan. 29	14.08 Dec. 8

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. basing points in cents per pound or dollars per gross ton unless otherwise indicated. Extras apply. Delivered prices do not reflect 3 pct tax on freight. Industry practice has discontinued arbitrary f.o.b. prices at Gulf and Pacific Ports. Space limitations prevent quotation of delivered prices at major ports. (1) Commercial quality sheet grade; primes, 25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 20¢ per base box. (6) For merchant trade. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb & over. (9) Carload lot in manufacturing trade. (10) Delivered Los Angeles only. (11) Hollowware enameling, gages 29 to 31 only. (12) Produced to dimensional tolerances in AISI Manual Sec. 6. (13) Delivered San Francisco only. (14) Kaiser Co. prices (15) to 0.035 to 0.075 in. thick by ¾ to 3½ in. wide. (16) Delivered Los Angeles; add ½¢ per 100 lb for San Francisco. (17) Slab prices subject to negotiation in most cases. Some producers charge (18) $2 more. (19) $1 per ton more.

Basing Points	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		San Franc'co, Los Angeles, Seattle	DELIVERED TO Detroit	New York	Philadelphia
INGOTS Carbon, rerolling	($36.00 per net ton f. o. b. mill) (Spot market as high as $75 to $90 gross ton)														
Carbon, forging	$46.00	(per net ton)													
Alloy	$56.00									(Canton = $56.00)					
BILLETS, BLOOMS, SLABS Carbon, rerolling[17]	$45.00[18]	$45.00[18]	$45.00[18]	$47.00	$45.00[18]	$45.00[18]	(per net ton)								
Carbon, forging billets	$54.00	$54.00	$54.00	$54.00	$54.00	$54.00	(per net ton)								
Alloy	$66.00	$66.00				$66.00	(Bethlehem, Massillon, Canton = $66.00)								
SHEET BARS							Subject to negotiation								
PIPE SKELP	2.90¢						2.90¢								
WIRE RODS	2.80¢[19]	2.80¢		2.80¢	2.85¢		(Worcester = 2.90¢)					3.52¢[13]			
SHEETS Hot-rolled	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢	2.80¢		(Ashland, Ky. = 2.80¢)		3.54¢[16]	3.01¢	3.148¢	3.040¢
Cold-rolled[1]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢	3.55¢		3.65¢	3.55¢			3.76¢	4.00¢	4.016¢
Galvanized (10 gage)	3.95¢	3.95¢	3.95¢		3.95¢		3.95¢	3.95¢	4.05¢	3.95¢	(Ashland = 3.95¢)	4.62¢[16]		4.298¢	4.190¢
Enameling (12 gage)	3.95¢	3.95¢	3.95¢	3.95¢			3.95¢		4.05¢	3.95¢			4.16¢	4.466¢	4.406¢
Long ternes[3] (10 gage)	4.05¢		4.05¢											4.566¢	4.506¢
STRIP Hot-rolled[3]	2.80¢	2.80¢	2.80¢	2.80¢[15]	2.80¢		2.80¢					3.60¢[16]	3.01¢	3.316¢	3.256¢
Cold-rolled[4]	3.55¢	3.65	3.65¢	3.55¢			3.55¢			(Worcester = 3.75¢)			3.76¢	4.066¢	4.006¢
Cooperage stock	3.10¢	3.10¢			3.10¢		3.10¢							3.616¢	
TINPLATE Cokes, 1.50 lb[5], base box	$6.80	$6.80	$6.80		$6.90			$6.90	$6.90	(Warren, Ohio = $6.80)				$7.248	$7.140
Electro, box 0.25 lb	Deduct $1.00 from 1.50 lb coke base box price.														
Electro, box 0.50 lb	Deduct 80¢ from 1.50 lb coke base box price.														
Electro, box 0.75 lb	Deduct 60¢ from 1.50 lb coke base box price.														
TERNES, MFG., special coated	Deduct 90¢ from 1.50 lb coke base box price.														
BLACKPLATE, CANMAKING 55 lb to 70 lb	Deduct $1.60 from 1.50 lb coke base box.														
BLACKPLATE, CANMAKING 75 lb to 95 lb	Deduct $1.70 from 1.50 lb coke base box.														
BLACKPLATE, CANMAKING 100 lb to 128 lb	Deduct $1.60 from 1.50 lb coke base box.														
BLACKPLATE, h. e. 29 ga[11]	4.75¢	4.75¢	4.75¢		4.85¢			4.85¢	4.85¢					5.198¢	5.090¢
BARS Carbon steel	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢	2.90¢					3.625¢[16]	3.06¢	3.35¢	3.356¢
Rail steel[6]	Subject to negotiation because of fluctuating scrap prices.														
Reinforcing (billet)[7]	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢	2.75¢				3.325¢[16]		3.098¢	2.990¢
Reinforcing (rail)	Subject to negotiation because of fluctuating scrap prices.														
Cold-finished[8]	3.55¢	3.55¢	3.55¢	3.55¢		3.55¢							3.71¢	4.00¢	4.006¢
Alloy, hot-rolled	3.30¢	3.30¢	3.30¢			3.30¢	3.30¢	(Bethlehem, Massillon, Canton = 3.30¢)							3.432¢
Alloy, cold-drawn	4.10¢	4.10¢	4.10¢	4.10¢		4.10¢			(Canton = 4.10¢)						
PLATE Carbon Steel[12]	2.95¢	2.95¢	2.95¢	2.95¢	2.95¢		2.95¢	(Coatesville = 3.45¢, Claymont = 3.65¢, Geneva, Utah = 3.10¢) 2.95¢				3.838¢[14]		3.298¢	3.190¢
Floor plates	4.20¢	4.20¢		4.20¢										4.716¢	4.656¢
Alloy	3.80¢	3.80¢	3.80¢		(Coatesville = 4.80¢)									4.316¢	4.256¢
SHAPES, Structural	2.80¢	2.80¢	2.80¢		2.80¢	2.80¢	(Geneva, Utah = 2.95¢, Bethlehem = 2.80¢)					3.43¢[19]		3.040¢	2.932¢
SPRING STEEL, C-R 0.08 to 0.40 carbon	3.55¢			3.55¢			(Worcester = 3.75¢)								
0.41 to 0.60 carbon	5.05¢			5.05¢			(Worcester = 5.25¢)								
0.61 to 0.80 carbon	5.65¢			5.65¢			(Worcester = 5.85¢)								
0.81 to 1.05 carbon	7.15¢			7.15¢			(Worcester = 7.35¢)								
1.06 to 1.35 carbon	9.45¢			9.45¢			(Worcester = 9.65¢)								
MANUFACTURERS' WIRE[9] Bright	3.55¢	3.55¢		3.55¢	3.55¢		(Worcester = 3.65¢, Duluth = 3.60¢)					4.56¢[13]		4.022¢	4.006¢
Galvanized	Add proper size extra and galvanizing extra to Bright Wire Base														
Spring (high carbon)	4.60¢	4.60¢		4.60¢	(Worcester = 4.70¢, Duluth = 4.85¢) (Trenton = 4.85¢)							5.737¢[13]		5.072¢	4.964¢
PILING, Steel sheet	3.30¢	3.30¢				3.30¢								3.75¢	3.756¢

CORROSION AND HEAT RESISTANT STEELS

In cents per pound, f.o.b. basing point

Basing Point	Chromium Nickel		Straight Chromium			
	No. 304	No. 302	No. 410	No. 430	No. 442	No. 446
Ingot, P'gh, Chi, Canton, Balt, Reading, Ft. Wayne, Phila.	Subject to negotiation			Subject to negotiation		
Blooms, P'gh, Chi, Canton, Phila, Reading, Ft. Wayne, Balt.	Subject to negotiation			Subject to negotiation		
Slabs, P'gh, Chi, Canton, Balt, Phila, Reading	Subject to negotiation			Subject to negotiation		
Billets, P'gh, Chi, Canton, Watervliet, Syracuse, Balt, Beth.	Subject to negotiation			Subject to negotiation		
Billets, forging, P'gh, Chi, Canton, Dunkirk, Balt, Phila, Reading, Water, Syracuse, Ft. Wayne, Titusville, Beth, Brackenridge	23.00	22.50	17.50	17.50	21.00	25.50
Bars, h-r, P'gh, Chi, Canton, Dunkirk, Watervliet, Syracuse, Balt, Phila, Reading, Ft. Wayne, Titusville, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Bars, c-f, P'gh, Chi, Cleve, Canton, Dunkirk, Syracuse, Balt, Phila, Reading, Ft. Wayne, Watervliet, Beth, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Plates, P'gh, Middletown, Canton, Brackenridge, Balt, Coatesville	31.50	29.50	23.50	24.00	28.00	33.00
Shapes, structural, P'gh, Chi, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Sheets, P'gh, Chi, Middletown, Canton, Balt, Brackenridge	39.00	37.00	29.00	31.50	35.50	39.50
Strip, h-r, P'gh, Chi, Reading, Canton, Youngstown	25.50	23.50	18.50	19.00	26.00	38.00
Strip, c-r, P'gh, Cleve, Jersey City, Reading, Canton, Youngstown, Balt, W. Leechburg	32.50	30.50	24.00	24.50	35.00	56.50
Wire, c-d, Cleve, Dunkirk, Syracuse, Balt, Reading, Canton, P'gh, Newark, N. J., Phila, Ft. Wayne, Brackenridge	27.50	26.00	20.50	21.00	24.50	30.00
Wire, flat, c-r, Cleve, Balt, Reading, Dunkirk, Canton, W. Leechburg	32.46	30.30	23.80	24.34	34.82	56.26
Rod, h-r, Syracuse	27.05	25.97	20.02	20.56	24.34	28.75
Tubing, seamless, P'gh, Chi, Canton, Brackenridge, Milwaukee	72.09	72.09	.....	68.49	.....	.....

TOOL STEEL

*F.o.b. Pittsburgh, Bethlehem, Syracuse, Dunkirk. *Also Canton, Ohio)*

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	82¢
18	4	1	—	5	$1.29
18	4	2	—	—	93¢
1.5	4	1.5	8	—	59¢
6	4	2	6	—	63¢

High-carbon-chromium*	47¢
Oil hardening manganese*	26¢
Special carbon*	24¢
Extra carbon*	20¢
Regular carbon*	17¢

Warehouse prices on and east of Mississippi are 2¢ per lb higher; west of Mississippi, 4¢ higher.

ELECTRICAL SHEETS

Base, all grades f.o.b. Pittsburgh

	Per lb
Armature	4.80¢ to 5.05¢
Electrical	5.30¢ to 5.55¢
Motor	6.05¢ to 6.30¢
Dynamo	6.75¢ to 7.50¢
Transformer 72	7.25¢ to 8.25¢
Transformer 65	7.95¢ to 9.20¢
Transformer 58	8.65¢ to 9.90¢
Transformer 52	9.45¢ to 9.70¢

F.o.b. Chicago and Gary: armature through motor only. F.o.b. Granite City add to lower quotation 0.45¢ for armature through & including 72, and 0.35¢ for balance.

RAILS, TRACK SUPPLIES

(F.o.b. mill)

Standard rails, heavier than 60 lb	
No. 1 O.H., per 100 lb	$2.75
Angle splice bars, 100 lb	3.85
(F.o.b. basing points)	*per 100 lb*
Light rails (from billets)	$3.10

	Base per lb
Cut spikes	4.85¢
Screw spikes	6.90¢
Tie plate, steel	3.65¢
Tie plates, Pittsburg, Calif.	3.80¢
Track bolts	7.00¢
Track bolts, heat treated, to railroads	7.25¢

Basing points, light rails, Pittsburgh, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, St. Louis, Kansas City, Minnequa, Colo.; Birmingham; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa.; Richmond.

ROOFING TERNEPLATE

(F.o.b. Pittsburgh, 112 sheets)

	20x14 in.	20x28 in.
8-lb coating I.C.	$7.05	$14.10

CLAD STEEL

Base prices, cents per pound

Stainless-clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Pittsburgh, Washington, Coatesville, Pa.	*24.00	*22.00
Nickel-clad		
10 pct, f.o.b. Coatesville, Pa.	31.50	....
Inconel-clad		
10 pct, f.o.b. Coatesville	30.00	....
Monel-clad		
10 pct, f.o.b. Coatesville	24.00	....
Aluminized steel		
Hot dip, 20 gage, f.o.b. Pittsburgh	....	9.00

* Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. Pittsburgh, Chicago, Birmingham

	Base Column	San Francisco
Standard & coated nails*	94	115
Galvanized nails*	94	115
Woven wire fence†	100	123
Fence posts, carloads††	105	...
Single loop bale ties	99	123
Galvanized barbed wire**	113	133
Twisted barbless wire	113	...

* Also Duluth; Worcester, 6 columns higher. † 15½ gage and heavier. ** On 80-rod spools, in carloads. †† Pittsburgh, Duluth only.

	Base per 100 lb	San Francisco
Annealed fence wire‡	$4.20	$5.21
Annealed, galv. fencing‡	4.65	5.66
Cut nails, carloads‡‡	6.30	...

‡ Add 10¢ at Worcester. ‡‡ Pittsburgh only, less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

base prices, cents per pound

Steel	Alde-cor	Corten	Double Strength No. 1	Dyn-alloy	HI Steel	Mayari R	Otis-coloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55	4.55
Sheets									
Hot-rolled	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30	4.30
Cold-rolled	5.30	5.30	5.30	....	.30	5.30	5.30	5.30	5.30
Galvanized		6.00	....	....	....	6.00	....	....	....
Strip									
Hot-rolled	4.30	4.30	4.30	...	4.30	4.30	4.30	4.30	4.30
Cold-rolled	....	....	5.30	....	....	5.30	5.30	5.30	5.30†
Shapes	....	4.30	....	....	4.30	4.30	4.30	4.30	....
Beams	....	4.30	....	....	....	4.30	....	....	....
Bars									
Hot-rolled	4.45	4.45	4.45	....	....	4.45	4.45	4.45	4.45
Bar shapes	....	4.45	....	....	4.45	4.45	4.45	4.45	....

† Pittsburgh, add 0.10¢ at Chicago and Gary.

PIPE AND TUBING

Base discounts, f.o.b. Pittsburgh and Lorain, steel buttweld and seamless. Others f.o.b. Pittsburgh only
Base price, $200.00 per net ton

Standard, threaded & coupled

Steel, buttweld	Black	Galv.
½-in.	47	29½
¾-in.	50	33½
1-in.	52½	36½
1¼-in.	53	37
1½-in.	53½	37½
2-in.	54	38
2½ and 3-in.	54½	38½
Wrought Iron, buttweld		
⅛-in.	+11	+35
¼-in.	+ 1½	+25
1 and 1¼-in.	4	+16½
1½-in.	9½	+13
2-in.	10	+12½
Steel, lapweld		
2-in.	44½	28
2½ and 3-in.	48½	32
3½ to 6-in.	50½	34
Steel, seamless		
2-in.	43½	27
2½ and 3-in.	46½	30
3½ to 6-in.	48½	32
Wrought Iron, lapweld		
2-in.	1½	+20
2½ to 3½-in.	4	+16
4-in.	8	+10½
4½ to 8-in.	6	+12

Extra Strong, plain ends

Steel, buttweld		
½-in.	46	30
¾-in.	50	34
1-in.	52	37
1¼-in.	52½	37½
1½-in.	53	38
2-in.	53½	38½
2½ and 3-in.	54	39
Wrought Iron, buttweld		
½-in.	+ 6½	+29
¾-in.	+ ½	+23
1 and 1¼ in.	4	+16½
2-in.	10	+12½
Steel, lapweld		
2-in.	43½	28
2½ and 3-in.	48½	33
3½ to 6-in.	52	36½
Steel, seamless		
2-in.	42½	27
2½ and 3-in.	46½	31
3½ and 6-in.	50	34½
Wrought Iron, lapweld		
2-in.	4½	+16½
2½ to 4-in.	13	+ 6
4½ to 6-in.	9	+10½

Basing discounts for standard pipe are for threads and couplings. For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. F.o.b. Gary prices are one point lower discount on all buttweld. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Net base prices per 100 ft, f.o.b. Pittsburgh in carload lots, cut length 4 to 24 ft, inclusive.

OD in in.	Gage BWG	Seamless Hot-Rolled	Seamless Cold-Drawn	Electric Weld Hot-Rolled	Electric Weld Cold-Drawn
2	13	$17.84	$20.99	$17.30	$20.36
2½	12	23.99	28.21	23.27	27.36
3	12	26.68	31.40	25.88	30.46
3½	11	33.35	39.26	32.35	38.08
4	10	41.40	48.70	40.16	47.24

CAST IRON WATER PIPE

Per net ton

6-in. to 24-in. del'd Chicago $91.12
6-in. to 24-in. del'd New York 89.18
6-in. to 24-in., Birmingham 79.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles for all rail shipment; rail and water shipment less 105.90

Class "A" and gas pipe, $5 extra: 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

Percent Off List

½ in. & smaller x 6 in. & shorter... 45
9/16 & ⅝ in. x 6 in. & shorter..... 46
¾ in. & larger x 6 in. & shorter..... 43
All diam, longer than 6 in. 41
Lag, all diam over 6 in. long..... 44
Lag, all diam x 6 in. & shorter..... 46
Plow bolts 54

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller 43
9/16 to 1 in. inclusive 42
1⅛ to 1½ in. inclusive 40
1⅝ in. and larger 35

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifin. Hexagon Nuts	USS	SAE
7/16 in. and smaller	..	46
½ in. and smaller	44	..
½ in. through 1 in.	.	44
9/16 in. through 1 in. ...	43	..
1⅛ in. through 1½ in. ...	41	42
1⅝ in. and larger	35	..

In full case lots, 15 pct additional discount. For 200 lb or more, freight allowed up to 50¢ per 100 lb, based on Cleveland, Chicago, Pittsburgh.

Stove Bolts

Packages, nuts separate .....65 and 10
In bulk 75

On stove bolts freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago, New York on lots of 200 lb or over.

Large Rivets (½ in. and larger)

Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham $5.65
F.o.b. Lebanon, Pa. 5.80

Small Rivets (7/16 in. and smaller)

Percent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 55

Cap and Set Screws

(In packages) *Percent Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright 53
¾ to 1 in. x 6 in., SAE 1035, heat treated 44
Set screws, oval points 56
Milled studs 29
Flat head cap screws, listed sizes... 16
Fillister head cap, listed sizes .. 37

Freight allowed up to 65¢ per 100 lb based on Cleveland, Chicago or New York on lots of 200 lb or over.

FLUORSPAR

Metallurgical grade, f.o.b. producing plant.

Effective CaF_2 Content:	*Base price per short ton*
70% or more	$35.00
65% but less than 70%	34.00
60% but less than 65%.....	33.00
Less than 60%	32.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

Per Gross Ton

Old range, bessemer..... $6.60
Old range, nonbessemer..... 6.45
Mesabi, bessemer 6.35
Mesabi, nonbessemer 6.20
High phosphorus 6.20

Prices effective for 1948 season.

METAL POWDER

Prices in cents per pound in ton lots, f.o.b. shipping point.

Brass, minus 100 mesh .....24¢ to 28½¢
Copper, electrolytic, 100 and 325 mesh .....30⅝¢ to 34⅝¢
Copper, reduced, 150 and 200 mesh .....30½¢ to 32¢
Iron, commercial, 100, 200, 325, mesh 96 + % Fe carlots..11.5¢ to 14.5¢
Swedish sponge iron, 100 mesh, c.l.f. N. Y., carlots, ocean bags..7.4¢ to 8.5¢
Domestic sponge iron, minus 48 mesh ..... 10¢
Iron, crushed, 200 mesh and finer, 90 + % Fe carload lots ..... 5¢
Iron, hydrogen reduced, minus 80 mesh, 98 + % Fe..... 11.00¢
Iron, hydrogen reduced, 300 mesh and finer, 98 + % Fe, drum lots .....63¢ to 80¢
Iron, electrolytic, unannealed, 325 mesh and coarser, 99 + % Fe.. 44¢
Iron, electrolytic, annealed, 100, minus 200 mesh, 99.5 + % Fe .....19.5¢ to 23.5¢
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe..... 39½¢
Iron carbonyl, 300 mesh and finer, 98-99.8 + % Fe .....90¢ to $1.75
Aluminum, 100, 200 mesh, carlots .....23¢ to 29¢
Antimony, 100 mesh ..... 44¢
Cadmium, 100 mesh $2.00
Chromium, 100 mesh and finer.. $1.025
Lead, 100, 200 & 300 mesh 20½¢ to 25½¢
Manganese, minus 325 mesh and coarser ..... 59¢
Nickel, 100 mesh ..... 51½¢
Silicon, 100 mesh ..... 29¢
Solder powder, 100 mesh..8½¢ plus metal
Stainless steel, 302, minus 100 mesh 75¢
Tin, 100 mesh ..... 90¢
Tungsten metal powder, 98%-99%, any quantity, per lb..... $2.90
Molybdenum powder, 99%, in 100-lb kegs, f.o.b. York, Pa., per lb.. $2.65
Under 100 lb $2.90

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$12.00 to $13.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	13.50 to 14.50
Foundry, Byproduct	
Chicago, del'd	$18.60
Chicago, f.o.b.	17.50
New England, del'd	20.40
Seaboard, Kearney, N. J., f.o.b.	17.85
Philadelphia, f.o.b.	17.75
Swedeland, Pa., f.o.b.	17.75
Buffalo, del'd	20.15
Ashland, Ohio, f.o.b.	15.50
Painesville, Ohio, f.o.b.	16.60
Erie, del'd	19.95
Cleveland, del'd	17.90
Cincinnati, del'd	18.59
St. Louis, del'd	18.03
Birmingham, del'd	15.76

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick *Carloads, Per 1000*

No. 1 Ohio $67.00
First quality, Pa., Md., Ky., Mo., Ohio 73.00
First quality, New Jersey 78.00
Sec. quality, Pa., Md., Ky., Mo., Ohio 67.00
Sec. quality, New Jersey 70.00
No. 2 Ohio 59.00
Ground fire clay, net ton, bulk 10.50

Silica Brick

Pennsylvania and Birmingham $73.00
Chicago District and Alabama 82.00
Silica cement, net ton (Eastern) .. 12.50
East Chicago 13.50

Chrome Brick *Per Net Ton*

Standard chemically bonded, Balt., Plymouth Meeting, Chester $64.00

Magnesite Brick

Standard, Balt. and Chester $86.00
Chemically bonded, Baltimore 75.00

Grain Magnesite

std. ⅜-in. grains

Domestic, f.o.b. Balt. and Chester in bulk, fines removed $51.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines 27.00
in sacks with fines 31.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢..$11.00

WAREHOUSE PRICES

Base prices, delivered metropolitan areas, per 100 lb.

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (15 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Philadelphia	$4.56	$5.77	$5.90	$4.82	$5.90	$4.85	$4.57	$4.87	$5.75	$8.47	$8.77	$10.30	$10.45
New York	4.76	5.76[1]	6.16	5.08	6.08	5.11	4.80	5.06	5.80	8.68	8.83	10.35	10.50
Boston	4.83	5.69	6.23[12]	5.61	6.87	5.18	4.91	5.04	5.88	8.99	9.14	10.43	10.58
Baltimore	4.32	....	5.72	4.80	....	4.77	4.71	4.85	5.71	....	....	....	....
Norfolk	4.90	....	....	5.30	....	5.15	5.15	5.20	6.00	....	....	....	....
Chicago	4.25	5.10	5.65	4.35	5.45-6.65	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
Milwaukee	4.458	5.308	5.858	5.058	5.658	4.808	4.608	4.608	5.395	8.645	8.795	9.945	10.095
Cleveland	4.25	5.10[1]	5.82	5.05	....	4.60†	4.70	4.40	5.10	8.61	8.76	9.50	9.65
Buffalo	4.25	5.10	6.03	5.23	5.72[5]	4.98	4.40	4.40‡	5.10	8.20	8.35	9.50	9.65
Detroit	4.41	5.26	6.07	4.77	5.67	4.9.+†	4.82	4.56-4.82	5.26	8.82	8.97	10.09	10.24
Cincinnati	4.56	5.22	5.77	4.77	....	4.98	4.82	4.78	5.63	....	....	....	....
St. Louis	4.61	5.46	6.22	4.71	6.02	4.96	4.76	4.76	5.67	8.92	9.07	10.22	10.37
Pittsburgh	4.25	5.10[1]	5.65	4.35	....	4.60	4.40	4.40	5.10	8.20	8.35	9.50	9.65
St. Paul	4.68	5.53	6.08	4.78	....	5.03	4.83	4.83	6.00	....	....	....	....
Omaha	5.262		6.712	5.362		5.612	5.412	5.412	6.112	....	....	....	....
Indianapolis	4.55	5.38	5.93	4.65	5.95	4.90	4.70	4.70	5.57	....	....	....	....
Birmingham	4.45[11]		5.80	4.45[11]	....	4.65[11]	4.40[11]	4.40[11]	6.13	....	....	....	....
Memphis	4.88[11]	5.94[1]	6.43	5.08[11]	....	5.23[11]	5.03[11]	5.03[11]	5.94	....	....	....	....
New Orleans	*5.05[11]	6.39[1]	....	5.25[11]	....	5.40[11]	*5.10[11]	*5.20[11]	6.39[6]	....	....	....	....
Houston	5.55		7.05	5.65	....	5.90	5.70	5.70	7.00	9.40	9.25	10.40	10.55
Los Angeles	5.75	7.35[1]	7.40	6.05	8.70[5]	5.55	5.35	5.50	7.35[14]	9.70[15]	9.55[10]	11.15[15]	11.30[15]
San Francisco	5.40[8]	6.65	7.05	5.75[8]	8.70	5.50	5.30	5.05	7.50	9.70[15]	9.55[15]	11.15[15]	11.30[15]
Seattle	5.45[4]	7.25[2]	7.10	5.60[4]	....	5.90	5.25[4]	5.45[4]	7.45[14]	....	8.95[16]	....	11.30[15]
Portland	5.45[4]	7.25[2]	7.10	5.85[4]	....	5.70[4]	5.40[4]	5.55[4]	7.45[14]	....	8.95[16]	....	11.30[15]
Salt Lake City	6.40	....	7.85	6.70	....	6.20	6.35	6.55	7.55	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED: Sheets, 400 to 1999 lb; strip, extras on all quantities; bars 1000 lb and over.

ALLOY BARS: 1000 to 1999 lb.

GALVANIZED SHEETS: 450 to 1499 lb.

EXCEPTIONS: (1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb.

* Add 46¢ for sizes not rolled in Birmingham

† Up to ¾ in. thick and 90 in. wide.

‡ Add 38¢ for sizes not rolled at Buffalo.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight.

BASING POINT* PRICES						DELIVERED PRICES† (BASE GRADES)							
Basing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.	Consuming Point	Basing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	40.00	40.50	41.00	41.50	.....	Boston	Everett	$0.50 Arb.			45.50	46.00	.....
Birmingham	38.88	36.38-39.38	.....	.....	.....	Boston	Steelton	5.78	45.78				51.78
						Brooklyn	Bethlehem	3.60	43.60	44.10	44.60	45.10	.....
Buffalo	40.00-41.88*	40.00-42.38*	40.50-42.88*	.....	.....	Cincinnati	Birmingham	5.85	44.73	42.23-45.23	.....	.....	.....
Chicago	38.50	39.00	39.50	40.00	.....	Jersey City	Bethlehem	2.21	42.21	42.71	43.21	43.71	.....
Cleveland	38.50-39.75*	39.00-40.25*	39.50-40.75*	.....	.....	Los Angeles	Provo	7.13	46.13	46.63	.....	.....	.....
						Mansfield	Cleveland-Toledo	2.56	41.06-42.31*	41.56-42.81*	42.06-43.31*	42.56	.....
Duluth	39.00	39.50	40.00	40.50	.....								
Erie	38.50	39.00	39.50	40.00	.....	Philadelphia	Bethlehem	2.00	42.00	42.50	43.00	43.50	.....
Everett		45.00	45.50	.....	.....	Philadelphia	Swedeland	1.21	43.21	43.71	47.21	47.71	.....
Granite City	39.50	40.00	40.50	.....	.....	Philadelphia	Steelton	2.59	42.59	.....	.....	.....	48.59
Neville Island	39.00	39.50	39.50	40.00	.....	San Francisco	Provo	7.13	46.13	46.63	.....	.....	.....
Provo	39.00	39.50	.....	.....	.....	Seattle	Provo	7.13	46.13	46.63	.....	.....	.....
Sharpsville	39.00	39.50	39.50	40.00	.....	St. Louis	Granite City	0.75 Arb.	40.25	40.75	41.25	.....	.....
Steelton	40.00	.....	.....	.....	48.00								
Struthers, Ohio	39.50	.....	.....	.....	.....								
Swedeland	45.00	45.50	46.00	46.50	.....								
Toledo	38.50	39.00	39.50	40.00	.....								
Troy, N. Y.	.....	.....	.....	.....	46.00								
Youngstown	39.00	39.50	39.50	40.00	.....								

* Republic Steel Corp. price. Basis: pig iron at Cleveland and Buffalo set by average price of No. 1 hvy. mlt. steel scrap at Cleveland or Buffalo respectively as shown in last week's issue of THE IRON AGE. Price is effective until next Sunday midnight.

Basing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over; manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct, C/L per g.t., f.o.b. Jackson, Ohio—$49.50; f.o.b. Buffalo—$50.75. Add $1.25 per ton for each additional 0.50 pct Si, up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $55.00 per gross ton, f.o.b. Lyle, Tenn. Delivered Chicago, $62.46. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size, f.o.b. Baltimore, Philadelphia, New York, Birmingham, Rockwood, Tenn.

Carload lots (bulk)	$145
Less ton lots (packed)	189.00
Delivered Pittsburgh	151.00

$1.80 for each 1% above 82% Mn; penalty, $1.80 for each 1% below 78%.

Briquets—Cents per pound of briquet, freight allowed, 66% contained Mn.

	Eastern	Central	Western
Carload, bulk	8.70	8.95	9.50
Ton lots	10.30	10.90	12.80
Less ton lots	11.20	11.80	13.70

Spiegeleisen

Contract prices, gross ton, lump, f.o.b. Palmerton, Pa.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Carloads	$51.00	$52.00
F.o.b. Pittsburg.h.	50.00	51.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, f.o.b. shipping point, freight allowed, eastern zone.

96% min. mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, bulk	32
L.c.l. lots	34

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads	32
Ton lots	34
Less ton lots	36

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, f.o.b. shipping point, freight allowed, eastern zone.

	Carloads	Ton	Less
0.07% max. C. 0.06% P, 90% Mn.	23.00	24.85	26.05
0.10% max. C.	22.50	24.35	25.55
0.15% max. C.	22.00	23.85	25.05
0.30% max. C.	21.50	23.35	24.55
0.50% max. C.	21.00	22.85	24.05
0.75% max. C., 7.00% max. Si.	18.00	19.85	21.05

Silicomanganese

Contract basis, lump size, cents per pound of metal, f.o.b. shipping point, freight allowed, 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload bulk	7.80
Ton lots	9.45
Briquet, contract basis, carlots, bulk freight allowed, per lb of briquet	8.75
Ton lots	10.35
Less ton lots	11.25

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $78.00, foundry, $79.00; $78.75 f.o.b. Niagara Falls; $77.50 f.o.b. Jackson, Ohio. Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 per ton for each 0.50 pct Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, f.o.b. shipping point, freight allowed, for ton lots packed.

	Eastern	Central	Western
96% Si, 2% Fe	16.90	17.50	18.10
97% Si, 1% Fe	17.30	17.90	18.50

Silicon Briquets

Contract price, cents per pound of briquet, bulk, f.o.b. shipping point, freight allowed to destination, 40% Si, 1 lb Si briquets.

	Eastern	Central	Western
Carload, bulk	5.25	5.50	5.70
Ton lots	6.85	7.45	7.75
Less ton lots	7.75	8.35	8.65

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
25% Si	15.50	....	....
50% Si	9.30	9.80	10.00
75% Si	11.80	12.10	12.85
85% Si	13.30	13.60	14.35
90% Si	15.00	15.30	16.00

Ferrochrome (65-72% Cr, 2% max. Si)

Contract prices, cents per pound, contained Cr, lump size in carloads, f.o.b. shipping point, freight allowed.

	Eastern	Central	Western
0.06% C	26.50	26.90	27.00
0.10% C	26.00	26.40	26.50
0.15% C	25.50	25.90	26.00
0.20% C	25.25	25.65	25.75
0.50% C	25.00	25.40	25.50
1.00% C	24.50	24.90	24.75
2.00% C	24.25	24.65	24.75
65-69% Cr, 4.9% C	18.60	19.00	19.15
62-66% Cr. 4-6% C. 6-9% Si.	18.60	19.00	19.15

Briquets — Contract price, cents per pound of briquet, f.o.b. shipping point, freight allowed, 60% chromium.

	Eastern	Central	Western
Carload, bulk	12.50	12.75	12.85
Ton lots	14.00	14.90	15.50
Less ton lots	14.90	15.80	16.40

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2¢ per lb to regular low carbon ferrochrome price schedule. Add 2¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, f.o.b. shipping point, freight allowed.

High carbon type: 60-65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

	Eastern	Central	Western
Carload	19.70	20.10	20.25
Ton lots	21.85	23.15	23.95
Less ton lots	23.35	24.65	25.45

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% mn, 1.25% max. C.

	Eastern	Central	Western
Carload	25.00	25.40	25.50
Ton lots	27.30	27.95	29.15
Less ton lots	29.10	29.75	30.95

Chromium Metal

Contract prices, cents per lb, chromium contained carload packed, f.o.b. shipping point freight allowed, 97% min. Cr. 1% max. Fe.

	Eastern	Central	Western
0.20% max. C.	97.00	98.50	99.75
0.50% max. C.	93.00	94.50	95.75
9.00% min. C.	91.50	93.00	94.25

Calcium—Silicon

Contract price per lb of alloy, lump, f.o.b. shipping point, freight allowed.

30-35% Ca, 60-65% Si, 3.00% max. Fe or 28-32% Ca, 60-65% Si, 6.00% max. Fe.

	Eastern	Central	Western
Carloads	16.25	16.75	18.80
Ton lots	19.35	20.10	22.25
Less ton lots	20.85	21.60	23.75

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, f.o.b. shipping point, freight allowed.

16-20% Ca, 14-18% Mn, 53-59% Si.

	Eastern	Central	Western
Carloads	17.50	18.00	20.05
Ton lots	19.80	20.65	22.40
Less ton lots	20.80	21.65	23.40

Calcium Metal

Eastern zone contract prices, cents per pound of metal, f.o.b. shipping point, freight allowed. Add 1.5¢ for central zone; 3.5¢ for western zone.

	Cast Turnings	Distilled
Ton lots	$1.85	$2.70	$3.40
Less ton lots	2.20	3.05	4.20

CMSZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25% Zr, 3.50-500% C.

	Eastern	Central	Western
Ton lots	18.00	19.10	21.05
Less ton lots	19.25	20.35	22.30

SMZ

Contract price, cents per pound of alloy, f.o.b. shipping point, freight allowed. 60-65% Si, 5-7% Mn. 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

	Eastern	Central	Western
Ton lots	15.75	16.85	18.80
Less ton lots	17.00	18.10	20.05

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, f.o.b. plant Niagara Falls, Washington, Pa., York, Pa., per pound contained W, 5 ton lots, freight allowed... $2.25

Ferrovanadium, 35-55%, contract basis, f.o.b. plant, freight allowances, per pound contained V.

Openhearth	$2.90
Crucible	3.00
High speed steel (Primos)	3.10

Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2 ... $1.20

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant, freight allowed, per pound contained Cb

Ton lots	$2.50
Less ton lots	$2.55

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. ... 95¢

Calcium molybdate, 40-45%, f.o.b. Langeloth, Washington, Pa., per pound contained Mo. ... 80¢

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langeloth, Pa., per pound contained Mo... 80¢

Molybdenum oxide in cans, f.o.b. Langeloth and Washington, Pa., per pound contained Mo... 80¢

Ferrotitanium, 40-45%, 0.10% C max., f.o.b. Niagara Falls, N. Y., ton lots, per pound contained Ti $1.23

Ferrotitanium, 20-25%, 0.10% C max., ton lots, per pound contained Ti

	$1.35
Less ton lots	$1.40

High carbon ferrotitanium, 15-20%, 6-8% C, contract basis, f.o.b. Niagara Falls, freight allowed, carloads, per net ton ... $142.50

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton

	$65.00
Less ton lots	$1.25

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Carload lots	18.40¢

Zirconium, 12-15%, contract basis, lump, f.o.b. plant, freight allowed, per pound of alloy

Carload, bulk	6.00¢

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carload	6.90¢
Ton lots	7.40¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Car lots	9.50¢
Ton lots	10.25¢

Boron Agents

Contract prices per pound of alloy, f.o.b. shipping point, freight allowed

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

Eastern	Central	Western
$1.20	$1.23	$1.21

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Ton lots	$1.89	$1.903	$1.935
Less ton lots	2.01	2.023	2.044

Nickel—Boron 15-18% B, 1.00% max. Al 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Less ton lots	$1.80	$1.8125	$1.8445

Silcaz, contract basis, f.o.b. plant freight allowed, per pound.

Carload lots	39.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 50 lb and over.

No. 1	93¢
No. 6	63¢
No. 79	45¢

Bortram, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

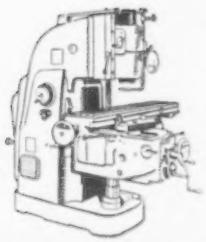
Carbortam, f.o.b., Suspension Bridge, N. Y., freight allowed, Ti 15-17%, B 0.90-1.15%, Si 2.5-3.0%, Al 1.0-2.0%.

Ton lots, per pound	8.0¢

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3%-4%, Si 40%-45%, per lb contained B ... $6.25

Extra S.A.*

without extra cost



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Advance PAINT COMPANY
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ECONOMICAL RINSE TANK DESIGN

(Continued from page 77)

principles of single tank design may be incorporated in multiple tank systems.

The remaining factor in rinse tank design is the rate of flow of the rinse water which is best determined by the allowable amount of salt in the water remaining on the work and can be established by simple inspection of the work for water marks, the salt residue left after evaporation of the water.

Water marks are easy to recognize and on finished work it is merely required for these residues not to be readily visible. The minimum water required by simple systems can be established by decreasing the flow until water marks reach the objectionable stage. A flow about 50 pct greater than this would then be safe.

As a preliminary step in tank design and selection where it is desired to investigate the amount of water required by different designs, the maximum tolerance for salt in the rinse water can be determined by dipping the work in progressively more contaminated rinse water solutions until water marks reach the objectionable stage and then analyzing the solution. Knowing the tolerance concentration of salt and the volume of contaminant or drag-in introduced to a tank by each rack of work, mathematical equations can be applied for calculation of the minimum rate of flow required by the variety of different tank designs.

Measurement of drag-in and the measurement of total salt in the tank at any given time is relatively simple and can be done with an inexpensive conductivity meter consisting of a wheatstone bridge with a cathode ray tube to indicate balance. The measuring cell for the meter should have two platinized electrodes that may be dipped directly in the tank. Such a conductivity meter will detect very small amounts of salt in the rinse so that the drag-in from a single rack can be determined by taking conductivity readings before and after introduction of a rack in still water and then by adding the contaminant quantitatively to a clean tank to obtain the same increase in conductivity.

This determination will establish the drag-in carried on each rack. Drag-out will be negligible or if desired can be calculated; however, great accuracy in the determination is not required since 50 to 100 pct flow in excess of the minimum should be used for safety purposes. The rinse problem actually is not to establish the minimum flow with great accuracy, but rather to determine if one tenth the water will do the job.

The most critical point in establishing minimum water flow is to determine the maximum allowable salt concentration in the rinse, and as previously mentioned this may be relatively easy if water marking can be used as a criterion. However, if the rinse is not the final process step and drag-in of the rinse to the next operation is critical some laboratory work may be required to establish the tolerance. This can be done empirically by contaminating the tank to the point where quality falls off. For instance, if the next step is a plating operation, quality can be measured by appearance or by poor plating quality, or if it is a cleaning or pickling, spotty work or troubles further in the process may determine the allowable drag-in or the maximum allowable salt concentration on the work.

To establish minimum flow for a single rinse tank the maximum salt concentration is taken to be the concentration that will eventually be reached for the steady flow with salt entering on racks at regular intervals. This will be the equilibrium point where the amount of drag-in salt equals the amount of salt at the maximum concentration carried away by the flow in the time interval from one rack of work to the next.

As an example, assume the drag-in to a single rinse tank to be 1.5 oz of 10 pct solution; the maximum allowable concentration to be 1 oz per cu ft; and the racks to be entering at the rate of one every 2 min.

At equilibrium:

$$salt\ in = 1.5 \times 0.10 = 0.15\ oz = salt\ out$$

$$flow\ \ required = \frac{salt\ out}{conc \times time} = \frac{0.15}{1 \times 2} = 0.075\ cfm$$

The method shows that the tank size does not enter into the calculation, but will merely change the time it requires to reach equilibrium. A small tank will approach equilibrium more rapidly and the concentration will drop faster after a rack is removed.

Assume the same problem for a double rinse similar to the tank shown in fig. 6, where water enters tank 1 and passes on to tank 2 and where the work is first introduced into tank 2.

In this case the salt entering tank 2 from tank 1 is small enough to be ignored since it is drag-in of drag-in.

At equilibrium for tank 2:

$$salt\ in = drag\text{-}in,\ and$$
$$salt\ out = flow \times conc. \times time$$

At equilibrium for tank 1:

$$salt\ in = drag\text{-}in\ from\ tank\ 2$$

$$concentration = tank\ 2\ conc. \times \frac{drag\text{-}in}{flow} \quad per\ unit\ time$$

From the equations the following can be derived:

$$flow = \frac{1}{time}\sqrt{\frac{salt\ out \times drag\text{-}in}{tank\ 1\ conc.}}$$

And, converting drag-in to approximate cu ft:

$$flow = \tfrac{1}{2}\sqrt{\frac{0.15 \times 0.0015}{1}} = 0.0075\ cfm$$

This approximate answer shows that only one tenth the water is required as for a single tank, but in the operation two dips will be required in place of one. The concentration in tank 2 will be 10 oz per cu ft.

If the problem is solved for two separate tanks each flowing at the same rate, the answer will be 0.0075 cfm per tank which shows that water consumption can be halved by the use of the counterflow tanks in series.

Calculations which show the effects of time and tank size can be made to determine the concentration of the rinse water at any given time, and the rate of approach to equilibrium can be determined.[1]

---

[1] *"Practical Conductivity Measurements," J. B. Mohler and J. Sternisha, Metal Finishing, February 1946, p. 58.*

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Progressive is more than a word at WISCONSIN. It's a *fact* that has been demonstrated by our development of Sulfite-Treated Steel — the highly machinable steel that overcomes the faults of resulphurized steels. "H" steels of guaranteed hardenability are a specialty of ours. Both of these steels are earning wide acceptance and acclaim.

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WISCONSIN STEEL

PERSONALS

(Continued from p. 112)

• **William S. James,** formerly director of research of the Ford Motor Co., has been elected vice-president in charge of engineering of Fram Corp., Providence.

• **R. S. Wobus,** manager of the Monsanto Chemical Co. plant at Norfolk, Va., has been promoted to the newly-created position of assistant to the plant manager of the John F. Queeny plant in St. Louis. Mr. Wobus is succeeded in Norfolk by **James H. Zwemer,** who has been assistant plant manager there. **Karl Ellingson,** a supervisor at the Queeny pilot plant, succeeds Mr. Zwemer as assistant plant manager.

• **O. B. Stauffer, Jr.** has been named assistant manager, advertising, American Steel & Wire Co., Cleveland. **John E. McGrath** had been promoted to the position of assistant manager, market development, and **C. C. Plumback** has been appointed director, merchandising market development. Since 1944 Mr. Stauffer has been supervisor, advertising production of American Steel & Wire. Mr. McGrath has been with the company since 1946 when he started as sales promotion supervisor. Mr. Plumback has been with American Steel since 1924, and has been supervisor of merchandising since 1947.

• **L. M. Keating,** assistant to the president in charge of distribution of the A. O. Smith Corp., has been appointed executive administrator of the company's Southwest district office in Houston, succeeding the late **B. F. Bart.**

• **David D. Wood,** sales engineer on the staff of the Superdraulic Corp., Dearborn, Mich., since 1946, has been promoted to general manager.

• **Edward J. McCann,** formerly general works manager of South Chester Tube Co., Chester, Pa., has been appointed vice-president in charge of operations. **Raymond F. Bradshaw,** formerly treasurer, has been made secretary and treasurer, succeeding **John W. Lawton,** who has retired as vice-president and secretary.

• **E. H. Phillips,** formerly manager of mine gears and parts division, Pittsburgh Gear Co., Pittsburgh, has been named general sales manager. **Francis Knuth** has been

PERSONALS

appointed controller of the company. Mr. Knuth formerly held a similar post for many years with the General Armature & Mfg. Co.

• **Andrew A. Priest** has been named factory manager of Thomas A. Edison, Inc., instrument division, West Orange, N. J. Mr. Priest has been previously associated with such firms as General Electric Co., Westinghouse Electric Corp., National Union Radio, and R.C.A.

• **L. P. Holladay, III,** has been appointed manager of sales development in the chlorine products division of E. I. du Pont de Nemours & Co.'s electrochemicals department, Wilmington, Del. Mr. Holladay joined the company in 1934 and has been a technical development investigator since 1944.

• **Sam L. Brous,** formerly manager of sales development, has been named head of the new chemical sales department of B. F. Goodrich Chemical Co., Cleveland.

• **James W. Arthur** has been appointed North Central district representative for General Electric wire and cable, Chicago. He joined the company in 1935. **Allen A. Olson** has been appointed Pacific district representative for GE wire and cable in San Francisco. Mr. Olson has also been with the company since 1935.

• **John Hieland** has been added to the staff of the Metal-Clean Solvent Corp. of Chicago. He will be in charge of research and development work for the corporation. Mr. Hieland had formerly been with Bell & Howell Co., Buick Motor Car Co., and the Pure Oil Co.

• **Henry F. Kalweit,** formerly controller of Bridgeport Safety Emery Wheel Co., Inc., Bridgeport, Conn., has been made president replacing **John T. Kilbride,** who has resigned as president and member of the board. **William G. Schultz** has been made vice-president in charge of sales and the machinery division, and **Frank B. Laurich,** vice-president in charge of the wheel division of the company.

• **Henry W. Schmidt,** who has been secretary of the Upson Co., Lockport, N. Y., for the past several years, has been elected secretary-treasurer. **James Z. Upson,** who has been associated with the company in various capacities, has been appointed assistant to the president

PERSONALS

of Upson. **Charles G. Ostertag** has been named sales manager for the central division of the company with headquarters in Atlanta. **George A. Engel,** who has been appointed western division sales manager with headquarters in Kansas City, has been sales representative in the Denver area for the past 7 years.

• **Frank A. Jones,** formerly associated with Terminal R. R. Co., Busch-Selzer Bros. Diesel Engine Co. and the Missouri Pacific R. R., has been appointed chief engineer of Dearborn Chemical Co., Chicago. **E. A. Goodnow,** whom he succeeds, has relinquished his position due to ill health, but he will remain with the company as assistant chief engineer.

• **Paul J. Roddy** has been appointed representative in charge of Greater New York, New Jersey and surrounding areas of Nicholson File Co., Providence. Mr. Roddy joined the company in 1935.

• **Donald L. Herr,** formerly in the U. S. Navy, has become associated with the engineering department of Allen-Bradley Co., Milwaukee.

• **R. Larracuenta** has been appointed export manager of Keller Tool Co., Grand Haven, Mich.

• **Jan M. Krol** has become affiliated with Sintercast Corp. of America, New York, as chief metallurgical engineer, and **Robert L. Pettibone** joins Sintercast as research metallurgist.

• **Clarence J. Smith** has been appointed chief engineer of Hydro-Line Mfg. Co. of Rockford, Ill. He was formerly general manager of the process equipment division of W. F. & John Barnes Co. **Frank G. Bastable** has been appointed sales representative in the midwest territory of Hydro-Line Mfg. Co. Mr. Bastable was formerly with the WPB as regional manager and is vice-president of Rockford Automotive Industries.

• **J. W. Littleton,** formerly division manager in Cincinnati, has been appointed manager of the Detroit territory of the air tool division, Aro Equipment Corp., Bryan, Ohio. **L. O. Barrett,** of the Cleveland office, replaces Mr. Littleton in Cincinnati. **C. Hoffman** has joined the factory sales force as a special sales representative. **E. A. Granzow** has

been made assistant to **E. J. Somerville**, division manager in Chicago. **E. T. Fairchild** has been appointed assistant to **G. M. Gille**, in the St. Louis territory. **B. Broekhuizen** has been appointed representative in the Atlanta territory, **H. J. Connell** has been made assistant to A. B. Schuhl, manager of the New York office, and **W. Y. Smith** has been appointed to the Boston office as assistant to T. F. O'Malley, manager in New England.

• **Fred Pasher** has been transferred from the position of manager of the Cleveland branch of the Wagner Electric Corp. to that of manager of the Dallas branch, replacing the late **B. B. Pierce. Elmer Gent,** Wagner automotive salesman in the Pittsburgh area, has been appointed to replace Mr. Pasher as manager of the Cleveland branch.

• **David A. Edwards** has been made engineering manager and **Paul F. Metz**, chief engineer, upon the consolidation of the industrial engineering and the product engineering departments of the Estate Heatrola Div., Noma Electric Corp., Hamilton, Ohio. Mr. Edwards joined Estate Heatrola Div. in 1946 as chief industrial engineer. Mr. Metz has been in the Estate engineering department for 25 years, the last 5 years as chief engineer.

• **Charles H. Weaver** has been named industrial manager, and **Quincy M. Crater,** transportation manager, each responsible for central district sales activities in his respective field at Westinghouse Electric Corp., Pittsburgh. Mr. Weaver formerly was marine and aviation sales manager at the Westinghouse East Pittsburgh works. Mr. Crater comes to his new position after 4 years as assistant manager of the Westinghouse Detroit office.

• **Brig. Gen. David N. Hauseman,** U. S. Army retired, has been elected president of Houdry Process Corp., Philadelphia, to succeed **Eugene J. Houdry,** founder of the company, who has retired. General Hauseman also has been made chairman of the board of Catalytic Construction Co., subsidiary of Houdry Process Corp. Newly-elected directors of Houdry Process are: General Hauseman; **Arthur V. Danner,** executive vice-president; **Claude C. Peavy,** chief engineer; **John E. Ford,** manager of commercial development; **Gordon A. Kessler,** manager of pat-

DANLY STRAIGHT-SI

THE RUGGED strength and precision construction of Danly Presses is a guarantee of greater production and continuing accuracy of stampings.

A circulating, filtered lubrication system keeps working parts under direct controlled lubrication.

The Danly Air Friction clutch is so designed that most of the moving parts rotate with the flywheel at all times, materially reducing the energy required for starting and stopping. Fully ventilated for cool operation, this clutch has, in its design, the charac-

teristics

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that

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1

2

1 POINT PRESSES

The 500 ton Eccentric Gear Press (*above*) was designed for a job which required a comparatively high tonnage exerted over a small area.

The heavy construction and massive rigidity of this press insure the accuracy of stamped parts, the safety of the dies. Danly single point presses are standard from 100 to 600 tons capacity.

2 POINT PRESSES

Typical of the entire line of Eccentric Gear Presses, the cleanly designed two point 400 ton press (*center*) is suitable for right to left or front to back feeding. Absence of overhanging machinery leaves plenty of headroom for feeding and scrap removal. 2 point presses are standard from 100 to 1200 tons capacity.

4 POINT PRESSES

The 1000 ton 4 point press (*right*) has a slide connection or suspension point at each corner of the slide. This method of suspension keeps the slide and bed in parallel even when off center dies are consistently used. Danly 4 point presses are standard from 100 to 2000 tons capacity.

Write for circular on Danly Eccentric Gear Straight-Side Presses

DANLY MACHINE SPECIALTIES, IN

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11SIDE PRESSES HAVE . . .

teristics that make for long life and low maintenance.

Notice the rugged massiveness of the presses shown below—the modern enclosed construction that increases safety and operator acceptance.

Men who work with presses—supervisors, maintenance men, and operators alike—will find in the Danly Press, the features they want for better, faster press operation—the features that result in greater volume production of more accurate stampings at lower unit cost!

1 Sound, Clean Welding
2 Stress Relieved Weldments
3 Precision Machining
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5 Accurate Alignment
6 Circulating Filtered Lubrication System
7 Disc-Type Clutch and Drum Brake
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THESE FEATURES GIVE YOU—

1 Accurate Stampings
2 Trouble-free Operation
3 Less Tool Wear
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6 Accessibility
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Result—

Greater volume production of more accurate stampings at *lower unit cost.*

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ent department; **C. G. Kirkbride**, manager of laboratories; **T. Ellwood Webster**, president of Catalytic Construction Co.; **George H. Daft**, comptroller; **John D. M. Hamilton**, secretary and general counsel.

• **Gordon E. MacLean** has joined the sales department of the Dearborn Chemical Co. after 7 years in the laboratory. He has been assigned to the Indianapolis district office.

• **Arthur S. Roberts** has been appointed secretary and counsel of SKF industries, Inc., Philadelphia. As secretary, he succeeds **Charles P. Collins,** who has resigned from this post and that of general counsel. Mr. Roberts has been associated with SKF since 1945 as assistant counsel specializing in labor relations and contractual agreements.

• **Hugh R. Bishop** has been named sales representative in the Chicago territory for the heavy chemicals division of the Pennsylvania Salt Mfg. Co. Mr. Bishop joined Pennsalt in 1939. He entered the Army in 1941 and upon his return to Pennsalt, he was named manager of the company's new products division.

• **Edward H. Finneran,** general supervisor of the American Steel & Wire Co.'s New England traffic department, has been made district traffic manager at Chicago. Mr. Finneran has been with the company since 1916.

• **William M. Fraser** has been made vice-president of Glass Fibers, Inc. in charge of eastern textile sales and engineering. He has resigned as vice-president and general manager of the Atwood Machine Co., Stonington, Conn.

• **William H. Schuster** has been appointed welding supervisor for the American Car & Foundry Co., New York. He was formerly with Foster Wheeler Corp. as welding engineer.

• **Joseph P. Kleinkort** has been named general sales manager of the Ramapo Ajax Div. of the American Brake Shoe Co., New York. He was formerly eastern district sales manager and has served in various sales positions since joining the company in 1923.

• **Nelson V. Joyce** has been elected vice-president in charge of purchasing of the Swan-Finch Oil

Corp., New York, and **John M. Parker, Jr.** has been named sales manager of the Tractor Div.

• **George W. Nordstrum** has been elected a director of the Shafer Bearing Corp., Chicago.

• **John S. Seltzer** has joined Jack & Heintz Precision Industries, Inc., Cleveland, as manager of customer service and stock control. He was formerly manager of purchases and stores at Westinghouse Electric Corp.'s Lighting Div.

• **T. A. Kay** has been appointed plant engineer of the Fontana, Calif. steel plant of Kaiser Co., Iron and Steel Div. Mr. Kay, formerly assistant plant engineer at Fontana, replaces **W. A. Vogt** who was transferred to Kaiser Engineers, Inc., Oakland, Calif.

• **Clark Moore** has been appointed manager of sales for Optimus Detergents Co., Matawan, N. J. Prior to joining Optimus, he was sales manager of the asphalt paving and industrial sales divisions of the Barber Asphalt Corp.

• **Willard K. Fohl** has been named manager of service for Lukens Steel Co. and its divisions, By-Products Co. and Lukenweld, Coatesville, Pa. Mr. Fohl has been associated with Lukens Steel since 1937. In conjunction with his duties as manager of service, he will continue with his duties as manager, railroad sales.

• **J. H. MacPhee** has been appointed General Electric Co. wiring device representative in the northeastern district with headquarters in Boston. He joined the company in 1940 as an appliance sales specialist. **John O. Wiley,** who was formerly assigned to the Minneapolis territory as representative for General Electric conduit products, has been appointed representative for the same line in Indiana and northern Illinois, with headquarters in Chicago. Mr. Wiley joined the company in 1946.

• **Dr. John A. Hutcheson,** formerly associate director, has been appointed director of the Westinghouse Research Laboratories, Pittsburgh, succeeding **Dr. L. Warrington Chubb.**

• **John E. Barbier** has been appointed sales manager of Murchey Machine & Tool Co., Detroit, and also in charge of tap sales for the Sheffield Corp., Dayton. **Frank A.**

PERSONALS

Henry, Jr. has been named field sales manager for Murchey products and **Fred L. Graham** field sales manager for Sheffield taps.

• **Edward J. Duffy** has been named manager of Kaiser Frazer's Ironton Blast Furnace Div. at Provo, Utah. He was transferred from the Fontana plant to serve as superintendent of their new iron production division.

• **Robert E. Mozena** has been appointed general manager of Steel Framing & Building Corp., Los Angeles. **R. C. Wainwright** has been named sales manager and **J. P. Gunn,** chief engineer, of the company.

• **Albert J. Capalbo** has joined the Flexible Plastic Coatings Dept. of Interchemical Corp.'s Finishes Div., New York. He was formerly chief chemist for the Plasticote Fabrics Corp., Passaic.

• **J. C. Wheeler** has been appointed administrative assistant to the Divisions' manager of General Electric's Apparatus Dept., Schenectady, and **William C. Elcan** is now manager of the Ordnance Sales Div. **Edward G. Haven** has been named manager and **Robert A. Averitt,** assistant manager of the Aviation Div.

• **A. O. Anderson** has been appointed senior field engineer of the western division for Rack Engineering Co., Pittsburgh. He was formerly production control manager of Ditto, Inc., Chicago.

• **E. P. Toal** has been elected New England-New York district manager of Hotpoint Inc., New York. Until recently he was sales manager of the standard radio receiver line of General Electric Co.

• **William H. Haag** has been appointed works manager of Perfection Stove Co., Cleveland, replacing **C. A. Blackburn,** who was recently promoted to vice-president and director of manufacturing.

• **Raymond E. Danto** has been appointed manager of the Organization and Analysis Dept. of Packard Motor Co., Detroit, succeeding **D. E. Miller.** Mr. Danto was formerly associated with Kaiser-Frazer Corp. and Ford Motor Co.

• **William H. Dodge,** has retired as Cleveland district traffic manager of American Steel & Wire Co., Cleveland, after 41 years of service. He

PERSONALS

has been succeeded by **Edward H. Finneran.** Mr. Finneran has been with the company since 1916 and was general supervisor in the Traffic Dept. at Worcester since 1944.

• **D. F. Kane** has been named manager of the U. S. Radiator Corp. plant at Dunkirk, N. Y. Mr. Kane has been an employee of the corporation for 33 years and has served as office manager of the Dunkirk plant for 30 years.

• **R. G. Huntress** has been appointed manager of wire rope sales for the California Wire Cloth Corp., Oakland, Calif. He joined Wickwire Spencer Steel Div. in 1937 and has held the position of assistant to the superintendent of the wire rope mill at Palmer, Mass., and later wire rope sales engineer.

• **R. R. Tatnall** has been appointed field service metallurgist in charge of customer relations for the Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div., New York. He has been connected with the company's Morgan plant at Worcester for 20 years, currently serving there as quality control manager.

• **Glenn E. Johnston** has joined Lukens Steel Co., Coatesville, Pa., as a member of its sales development staff. Mr. Johnston was previously a special representative of the composite steel and composite tool steels divisions of Jessop Steel Co.

• **F. J. Stokes,** founder and president since 1895 of the F. J. Stokes Machine Co., Philadelphia, has become chairman of the board and is succeeded in the presidency by **Francis Dougherty, Jr.** Mr. Dougherty has been with the company since 1928 and was formerly secretary-treasurer.

• **Dr. M. S. Agruss** has been appointed director of the Research and Development Dept. of the Precision Scientific Co., Chicago. He was previously a consultant in the field of petroleum technology and chemistry and was also research supervisor with the Pure Oil Co. for 10 years.

• **F. W. McGrath,** formerly sales manager, is now vice-president in charge of sales of the Appliance Mfg. Co., Alliance, Ohio. **K. J. Crider,** formerly factory manager, is now vice-president in charge of manufacturing of the same company.

Republic to Use New Blowing Technique On Five Blast Furnaces

Cleveland

• • • **Republic Steel** Corp. will extend the use of its recently developed high top pressure blast furnace blowing technique to five additional furnaces during the present year, according to an announcement by E. M. Richards, vice-president in charge of operations.

By this practice greater than normal volumes of air are blown into the bottom of a blast furnace while a throttle valve at the top restricts escape of the waste gases, thus building up gas pressure within the furnace, and reducing the velocity at which the gas passes through the furnace. As a result, the coke burns more efficiently, a greater quantity of pig iron can be produced per day, cost of pig iron production is less, and ores of fine particle size can be economically used.

A Republic furnace in Cleveland has been on high top pressure operations since July 1, 1946. A burden of ore leaner than the average has been used and during most of this period no scrap or sinter has been added. The production has soared as high as an average 1484 tons per day over a single month.

Coke consumption per ton of iron produced has been reduced 200 lb to 250 lb. This furnace has been blown with air volumes as high as 110,000 cfm at 31 lb pressure. In ordinary practice air volumes of 85,000 cfm are extremely rare. The pig iron production of a blast furnace is in direct proportion to the amount of air blown into the furnace.

When the high pressure installations are completed on the additional five furnaces, the increased pig iron capacity which will result will be nearly the same as if an additional furnace had been built.

Installations will be made at furnaces at Warren, Ohio, Buffalo, South Chicago and at two additional Youngstown furnaces. New blowing equipment will be installed at Buffalo and Warren, but the other furnaces will use their present blowing machinery.

Increases in pig iron production by high top pressure operation is one way Republic hopes to make up

for the current shortage and high price of scrap.

In addition the decrease in the amount of coke consumed for each ton of iron produced will assist in eliminating the need for some coke, also a scarce and expensive item. The program will enable Republic to further its steelmaking operations rather than to increase merchant iron supplies.

The most important installation will be at the Warren furnace where a large new turbo-blower is to be installed. This blower, now under construction by the Ingersoll Rand Co., will be able to provide 125,000 cfm of air at 40 lb pressure. It will be the largest air moving and compressing machine in use in the steel industry.

With this blower and adaptation of the furnace to high top pressure operation, production is expected to top 1600 tons of iron per day. This is more than twice the rated capacity of the average American blast furnace and 25 pct above the rated capacity of this furnace.

The new Buffalo turbo-blower will be a 5-stage compressor, able to provide 95,000 cfm at 40 lb pressure. The installation will be very similar to that of the Youngstown No. 3 furnace where good results have been obtained.

Conversion of two additional furnaces at Youngstown will ultimately result in pig iron increases which will enhance the importance of Republic's steel works in that city as a supplier of slabs, billets and bars to the company's finishing mills in Youngstown and elsewhere.

The Chicago furnace when completely installed for high pressure operation will be almost identical with the Cleveland unit and correspondingly increased tonnages are expected. Republic's Chicago plant is a large supplier of alloy and carbon bars and billets to the trade and produces large tonnages of wire and wire products including nails.

Add to OIT License List

Washington

• • • **Woven wire** fencing and wire cable and rope have been added to the positive list of commodities requiring validate licenses, according to an Office of International Trade announcement. The action, effective Mar. 22, does not affect insulated wire cable and rope.

Republic Net Doubled Last Year; Production At 92 Pct of Capacity

Cleveland

• • • **Republic Steel** Corp. has reported 1947 consolidated net income of $31,018,410 on total sales of $649,824,006. Net compares with $16,033,469 for 1946 on sales of $415,749,805.

In a letter to shareholders, T. M. Girdler, chairman, and C. M. White, president, stated that Republic's steel shipments of 6,073,125 tons broke all previous company records. Operations were at an average rate of 92.9 pct capacity, "being somewhat restricted by shortages of raw material and men. The supply of steel scrap especially was insufficient to permit maximum operations and high scrap prices contributed materially to increased costs."

Mr. Girdler and Mr. White pointed out that Republic, as well as other steel companies, announced moderate increases during the year on some products which were being sold at a loss. "Semi-finished steel, which amounted to only about 6 pct of Republic's steel shipments, was one of these. It was produced at a loss in 1946 and in 1947 losses on this product were as high as 20 pct in the fourth quarter.

"To correct this situation, Republic increased the price on forging blooms, billets and slabs by $8 per ton in July, 1947. When other steel producers increased by a lesser amount, Republic reduced its prices to those of the other steel companies. The increase in Feb. 1948, will reduce the losses on semi-finished steel.

"During 1947 capital expenditures for plants and properties amounted to $32,925,275. Appropriations for this purpose since the end of World War II have amounted to $71,381,450.

Commenting on the Federal Trade Commission's action in instituting proceedings against the American Iron & Steel Institute and various steel companies, including Republic Steel Corp. and its subsidiary, Truscon Steel Co., the executives charged that while the complaint alleges an illegal conspiracy to fix prices by the steel industry, "it is actually a proceeding to have declared illegal the delivered price system of selling, which has been in effect for half a century in the steel business as well as many others.

"If this action of the Commission were to be successful, it would limit Republic's markets to the areas immediately adjacent to its plants, thereby forcing Republic to retire from nationwide business."

	Comparison of 1947 and 1946 1947	1946
Total Sales	$649,824,006	$415,749,805
Mfg. costs of products sold	550,712,444	358,877,747
Depreciation	18,901,535	11,632,704
Total Taxes	33,666,072	16,849,744
Net Income	31,018,410	16,033,469
Per share of common stock	5.17	2.53
Steel shipments	6,073,125 tons	4,651,232 tons
Rate of operation (ingots)	92.9 pct	70.3 pct

Firms Its Prices

Hamilton, Ohio

• • • **Hamilton Foundry & Machine Co.** has announced to the trade that prices quoted since Jan. 1, 1948 are continued in effect for shipments up to and including June 30, 1948.

In a letter to customers, Peter E. Rentschler, president, Hamilton Foundry & Machine Co., stated that "in the interest of casting price stability the rate increases for molders, coremakers, and core assemblers made effective Mar. 1, 1948, under a new agreement with the International Molders & Foundry Workers Union of North America (AFL) and such other wage and salary adjustments that must necessarily follow are being absorbed for the period to June 30, at which time another review of our situation will be in order."

Mr. Rentschler pointed out that customer short delivery requests are an increasing problem and asked customers to be reasonable in delivery demands, as the manpower problem is already affected by approaching spring and will be more so as "hot" weather arrives.

Armco Earnings Up In '47

Middletown, Ohio

• • • **Consolidated net** earnings of the American Rolling Mill Co. for 1947 were $25,002,211 after taxes, Charles R. Hook, president, reported. Net is equal to $7.44 per share on the 3,240,523 common shares outstanding during the year. In 1946 Armco earned $18,552,491 after taxes, or $5.35 per common share.

The company's net sales for 1947 were $311,685,322, compared with net sales of $231,930,811 in 1946, an increase of almost $80 million.

NEWS OF INDUSTRY

New Ingot Production Facilities Are Canadian Need to Jump Output

Toronto

• • • **Production of** finished and semi-finished steel during 1947 was at the highest peace-time record in Canadian history, and more than doubled any year earlier than 1942. It is expected that 1948 will equal or slightly better the previous year's record, although no large increase in production can be anticipated in view of the fact that raw materials for finishing mills will not be available in much better tonnage than in 1947.

The consumption capacity of finishing mills in Canada is considerably in excess of this country's capacity for the production of steel, and the former is expanding more rapidly than the latter. Thus it is apparent that while finishing mills are not operating at capacity, they are producing to the full limit of their steel supply.

Measures to correct this situation are under consideration by some of Canada's larger basic steel mills. The Steel Co. of Canada Ltd., last year completed and put in operation a new battery of coke ovens. Earlier this year officials of the Steel Co., announced that consideration was being given to the installation of another blast furnace and it is understood that this would involve additional coke ovens, as well as other equipment associated with pig iron production.

Should the company proceed with its program for greater pig iron output, it would appear that some consideration would have to be given to larger capacity in its open hearth department to make sufficient steel available for its finishing mills. However, it would require a year or two to fully complete such a large expansion program.

The new cold rolling mill at the company's Hamilton works, which has been in process of installation for the past two or three years, is planned to go into operation about the middle of this year and will have a capacity of about 350,000 tons a year. If this mill is utilized to full capacity it will mean that some other departments will be robbed of steel to feed it and their production decreased.

Official announcement also was made a short time ago that Dominion Foundries & Steel Ltd., Ham-

ilton, plans installation of a blast furnace, which with assessory units, will represent an expenditure of some $15,000,000. At the present time Dominion Foundries has no blast furnace, but has been depending on purchased pig iron and scrap to meet its requirements.

For the immediate future, and in fact for the next three or four years, one of the more serious problems to be overcome by Canadian steelmakers, is the iron and steel scrap shortage. This shortage is "real", and while it has not yet had serious effect on steel production it is questionable as to how long current production schedules can be maintained with the uncertainties regarding scrap supply.

The big consumers in this country, as well as dealers and brokers, are quite definite in their predictions that there is not sufficient domestic scrap to take care of demand and large tonnages will have to be imported. Steel mills have been tapping all available sources for scrap, including points as far away as Hong Kong and Australia.

Steel production in Canada is meeting about two-thirds of domestic requirements, with most of the remaining third imported from the United States. At the beginning of March Canada placed a ban on certain steel imports from the United States. However, these restrictions involved only about a half dozen items and do not include structural steel shapes and machinery as earlier reported. According to official Ottawa, other items are to be added to the list as time advances, but in the meantime Canada's imports from the States are running at approximately the same level as last year.

New order placing for finished steel products has slowed down as producers have only limited capacity available through second quarter and books have not opened for third quarter contracts. Steel sheets and plates are providing the most problems with regard to supply and mills are fully booked on these items and making deliveries to consumers and warehouse operators on a quota basis. Carbon steel bars has eased slightly but no surplus stocks are reported. Cold drawn steel, stainless steel and alloy steels are in good supply with no shortages reported. Structural steel shapes are tight and there is still fear that the government soon may enforce its ban on imports. Nail

production has been stepped up but there has not been much improvement in supply available to retailers or builders.

Available pig iron supply for merchant melters is running about 40,000 tons monthly and it is reported that overall consumer requirements could absorb a further 25 pct of this total. The shortage of iron scrap has forced many foundries to full use of pig iron in melting operations and this has brought heavier demand for iron.

At the present time 12 of the 14 furnaces in Canada are blowing and maintaining a production rate of slightly better than 70 pct of total rated capacity. Pig iron, like steel sheets and plate, is being released to consumers and warehouse distributors on a quota basis. Pig iron prices are as follows: Base grade, 2.25 silicon and under, $39.50; malleable, $40.00; basic, $39.50 delivered gross ton Toronto.

Midland Steel Net Rises

Cleveland

• • • **Despite steel shortages,** Midland Steel Products Co. reported 1947 net income at an all-time high of $3,503,426, or $11.21 per share of common stock. This compares with the company's 1946 net of $1,552,889, or $2.90 per common share.

That sales volume, and not high selling prices, accounted for the increase, was demonstrated by figures for previous years. "During 1947 our sales were $49,028,445, or more than 50 pct greater than during any previous peacetime year," president E. J. Kulas stated in his letter to shareholders.

"Our 1947 sales were over double our 1939 sales, but net income per dollar of sales was 41 pct less during 1947 than during 1939. In fact, net income per dollar of sales was less during the past year than during any prewar year since 1934."

Shortage of steel was cited as the greatest production problem of the past year. Mr. Kulas warned stockholders that it continues to be a major one for the entire steel fabricating industry.

However, in stating his view of the 1948 outlook, Mr. Kulas said Midland's "productive capacity . . . and the demand for products is high. If we have the whole-hearted support of our principal steel suppliers, I believe we can meet the demands upon us to the satisfaction of our customers."

NEWS OF INDUSTRY

Jet Engine Design Problems Discussed Before ASM Panel

Chicago

• • • **Problems of** jet engine designers in the use of high temperature alloys were presented at the American Society of Metals panel at the Chicago Technical Conference recently.

The requirements of turbine disc materials were discussed by O. E. Rodgers, manager, development and research engineering of the aviation gas turbine division, Westinghouse Electric Corp. He pointed out that the rim temperature of the disc attained a maximum of 1050°F while the center usually averages 800°F. Design is based on a tensile stress of 30 to 35,000 lb per sq in. with creep figures at 0.1 to 0.2 pct in 500 hr.

Mr. Rodgers declared that the most important requirement of disc materials is that they must have good ductility. In material for blades, ductility is not of prime importance but good creep resistance is necessary. The temperature attained by blades in the 19XB engine is 1150°F at the hub, 1400° at the center and 1250°F at the tip, the speaker said. The inlet gas temperature from the combustion chamber on this engine was given at 1500°F.

Discussing the combustion chamber, which is the hottest part of a turbine engine, the speaker listed four basic requirements; that the sheet metal used in construction be easily formed, the material must be weldable without appreciable loss of strength, the metal must be ductile at all operating temperatures, and the material must be of good or fair machinability.

Mr. Rodgers recalled that a gas turbine reaches operating temperatures 40 sec after starting. He pointed out the danger of exceeding the yield strength of any of the materials in starting the engine and the problem of designing so that rapid changes in mass would not produce steep temperature gradients which might cause failure due to uneven expansion of any part of the engine. He pointed out why jet engine designers have to taper their section from large to small very carefully in order to avoid this difficulty. Mr. Rodgers explained Westinghouse's method of cooling the turbine rotor discs. A certain portion of gas which de-

livers out of the compressor chamber at about 400°F is bled down beneath the combustion chamber onto the face of the disc, producing a relatively cool air blanket.

Drawing on 6½ yr experience that his company has had in turbines for aircraft use, Mr. Rodgers outlined the design and development of six different types of engines. Most of the discussion centered around the 9½ B engine which develops 275 lb of static thrust at 36,000 rpm, and the 24 C engine which develops 3000 lb thrust at 12,500 rpm. The 24 C engine designated by the Army and Navy as J34, powers the McDonnell "Banshee" pursuit ship used by the services.

Mr. Rodgers pointed out the difficulty that was first encountered in the combustion chamber where double wall construction or lapping over of welded sheet caused the unequal temperature condition to buckle the sheet metal parts. He told the meeting that the trouble has been solved by using a heliarc butt weld so that abrupt changes of mass were obviated. During the discussion period, the higher temperature requirements of the newly developed after burners on some jet engines were briefly discussed. It was pointed out that as long as air is used as a fuel, 3000°F is about the top temperature that can be achieved and that the after burner gas temperature has been found to be approximately 3000°F.

Other speakers on this panel were H. E. Grenoble, development metallurgist, Thompson Laboratory, General Electric Co., whose subject was "High Temperature Alloys in Present Day Use," and W. N. Harrison, chief, enameled metals section, National Bureau of Standards, who presented "Ceramic Coatings on Molybdenum."

Co-chairman Dr. J. T. Rettaliata, director, Department of Mechanical Engineering, Illinois Institute of Technology, stated there are at present built or being built 53 gas turbines in the world, totaling an output of 276,500 kw. Of this group, 27 turbines are of the stationary class and 26 are classified as transportation and marine engines.

The evening meeting on atomic energy and the metallurgist, in which Dr. Bruce S. Old, chief, metallurgy and materials branch, division of research, U. S. Atomic Energy Commission, was chairman,

was strictly a classified meeting. Dr. Old outlined the metallurgical problems faced by AEC. Dr. Harley Wilhelm, associate director, Atomic Energy Commission Project, Iowa State College, then gave an abbreviated resume of the Smythe Report. He carried the samples of metallic beryllium, thorium and uranium which were chained to his brief case. James Schumar, acting division director, metals division, Argonne National Laboratory, then also presented a classified talk on "Beryllium, Uranium and Thorium, Their Melting and Fabrication."

Japanese Sponge Iron Padded Steel Output During Wartime Years

Washington

• • • **Japan's iron and** steel industry, overtaxed by the preparations for World War II, was able to increase its industrial output in wartime by producing considerable tonnages of sponge iron, according to a new Bureau of Mines publication.

Between 1939 and 1945, eleven Japanese plants produced 646,386 metric tons of sponge iron, about 40 pct of which was produced in Korea, where high-grade ore was available, according to the Bureau report.

In contrast to prewar years when 80 pct of its iron ore was imported, Japan was forced to rely on low-grade domestic deposits as shipping restrictions tightened during the war. Two principal mines, the Kuchan mine on the island of Hokkaido and the Kamaishi mine in northeastern Honshu, accounted for 70 pct of the domestic production, the remainder coming from small scattered deposits of limonite, hematite, and magnetite. The ores were soft and fine-sized requiring treatment before entering the blast furnace.

The 11 plants containing 31 rotary kilns constructed in Japanese territory since 1938 utilized the Krupp-Renn process for making sponge iron from low-grade iron ore and low-grade coal. In this process, a mixture of iron ore and coal or coke is heated in a rotary kiln to produce iron pellets and slag. The iron pellets, which are used as a melting stock to make steel, are recovered magnetically from the slag after the heated mixture is

quenched with water, crushed, ground in a ball mill, and screened. Japanese plants used anthracite from Korea as the reducing agent and pulverized domestic subbituminous coal for firing and kilns.

The Bureau report described the operation of the Iwataki plant on the west coast of Honshu as well as other rotary kiln plants and plants using batch kilns, ascending kilns, and electric furnaces.

A free copy of the publication, Information Circular 7440, "Sponge Iron in Japan," may be obtained by writing to the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Penna.

Approves Display Of Gray Iron Castings

Cleveland

• • • **Northern Ohio** group of Gray Iron Founders' Society at a recent meeting here outlined a proposal to develop a display of gray iron castings at Case Institute of Technology. The group unanimously approved the project and provided for the appointment of a committee to develop such a display and provide for its proper maintenance.

R. L. Collier, executive vice-president of the society, reported on latest development in connection with pig iron allocation under Public Law 395 (the so-called Anti-Inflation Act). He said the Dept. of Commerce, which has jurisdiction under the act, has recently given further assurances that no pig iron allocation programs affecting the industry will be approved or put in operation without the society having an opportunity to be heard.

Argentine Orders Locomotives

Mount Vernon, Ohio

• • • **Thirty-five American-built** twin-Diesel railroad locomotives have been ordered by the Argentine State Railways to replace present steam equipment. They are being built by the General Electric Co., at Erie, Pa., and will be powered by 70 Cooper-Bessemer Type FV-L 12-cylinder Diesels, each rated 1000 hp at 915 rpm. These are among the most powerful Diesel locomotive engines built.

The engine order is the largest ever received by the Cooper-Besse-

mer Corp., for peacetime operation in the company's 115 year history, according to Fletcher M. Devin, manager of its railway engine division.

Twenty-four of the Diesels will power 12 of the railroad's 150-metric ton locomotives, each to be equipped with two engines and the remaining 46 engines will power twenty three of its 170-metric ton locomotives.

The new locomotives will be specially designed to operate on 1-meter gauge tracks. Although they will be streamlined like main line American units, the cabs will be of light weight design to meet the low axle loading requirements in use in the Argentine. American railroads usually allow about twice the axle loading capacity on locomotives in main line operation, due to the use of heavier rails and sturdier road beds.

The thirty five new locomotives are expected to be delivered early in 1949 Mr. Devin said.

Management Group Formed in East By Foundry Executives

Boston

• • • **At the largest** meeting of gray iron foundry executives in the history of New England at the Engineering Club here, a New England management group of Gray Iron Founders' Society was formed.

The following group officers were elected: Chairman, George F. Hutchins, 2nd, treasurer, Standard Foundry Co., Worcester; vice-chairman, E. H. Bradley, vice-president and general manager, Builders Iron Foundry, Providence; secretary-treasurer, Thomas I. Curtin, Jr., president, Waltham Foundry Co., Waltham, Mass.

R. L. Collier, executive vice-president, Gray Iron Founders Society, in addressing the management group, stated that shipments of gray iron castings in 1947 were 21 pct greater than in 1946. Comparable figures for other segments of the foundry industry were: Steel castings 14 pct, malleable 9 pct and nonferrous castings 4 pct. He also announced that the Office of Defense Transportation, in line with society representations, has found it unnecessary to allocate pig iron for the freight car program under Public Law 395.

SHOOTING WIRE: The use of rockets in laying lightweight field telephone wire over inaccessible terrain by means of an improved type wire dispenser has been proven practical by recent signal corps tests at Ft. Dix, N. J. The rocket may be fired without the use of a rocket launcher by laying it in a wedge-shaped hole dug in the ground.

National Malleable Backlog Up

Cleveland

• • • **National Malleable & Steel** Castings Co. has a backlog of orders considerably larger than a year ago and is booked to capacity on some items until the fourth quarter, Wilson H. Moriarty, vice-president, told a group of sales and operating executives from the company's plants in Chicago, Indianapolis, Sharon and Cleveland. He said sales in the first quarter of 1948 are estimated at about $12 million, comparing with $9,600,000 in the first quarter of 1947. The railroad carbuilding industry hopes to produce 120,000 cars in 1948, he reported—twice as many as in 1947. Because of the importance of the railroad carbuilding program, it would be definitely favored in the event of allocations of steel and other materials, he said.

Production of castings for the automotive and other industries was limited last year by plant capacity, which is now increasing as a result of the company's modernization program, according to Mr. Moriarty.

Plywood Plant for Africa

New York

• • • **A French company** is building a large plant at Port Gentil, French Equatorial Africa, to produce plywood. It was disclosed that U. S. Plywood Corp., 55 West 44th St., New York, is supervising design, purchase, construction and installation of equipment for Cie Francaise De Gaban.

The Baldwin Locomotive Works, Eddystone, Pa., is building six steam platen presses for processing plywood at the African plant. Two of the units will be of 865-ton capacity with 106x65-in. platens.

Employment Trend Up

Washington

• • • **January employment** levels in nonagricultural stood at 42,950,000 workers, more than 1.1 million above a year ago despite post-holiday layoffs of nearly a million temporary workers, according to Bureau of Labor Statistics. Greatest increase over the year-end total was in the automotive industry which added 11,000 workers during the month.

Stewart-Warner Shows Sales Were 30.6 Pct Greater Than in '46

Chicago

. . . **James S. Knowlton,** president and chairman of the board of Stewart-Warner Corp., Chicago, at a press conference held on Mar. 31 reported the record breaking peacetime sales of $76,930,304, which was 30.6 pct greater than in 1946. Net earnings in 1947 were $1.88 a share greater than those of any peacetime year since 1929, Mr. Knowlton said. "The figures should be taken with a very considerable seasoning of salt," Mr. Knowlton added. He cited the fact that the prewar average pay of employees has more than doubled.

The cost of equipment has increased more than 50 pct. Compared to 1939, it now takes 65 pct more working capital to carry the same number of items in inventory than it did in prewar years. Corporate income tax rates, Mr. Knowlton stated, are 153 pct higher than in 1937. Net sales in 1947 were $18,035,047 greater than the total for 1946.

For the fourth consecutive year dividends totaling $1.00 a share of the $5.00 par value common stock were paid. Late in 1947 the directors of Stewart-Warner announced they would consider dividend payments quarterly in the future. Accordingly, a dividend of 25¢ a share was paid Jan. 10, 1948, and a similar payment will be made on April 10.

At the press conference Mr. Knowlton reported that sales for the first quarter of this year were off by 10 pct for the same period last year. The backlog of orders held by the company is down but Mr. Knowlton could not give accurate figures as to how much. He reported that his plant has not been approached by the Army or Navy or any government agency in regard to a survey of possible military production of wartime material. Mr. Knowlton definitely went on record as opposed to government allocation of scarce materials. Inventories have been reduced over last year.

At the end of 1947, inventories of finished goods, work in progress, raw materials and manufacturing supplies were listed at $11,960,082 after deducting reserve for possible future inventory price decline. This compares to $13,596,880 for 1946 or a reduction of $1,636,798.

Construction Material Output Rising in '48

Washington

. . . **Barring serious** work stoppages, the production picture for construction materials is brighter than a year ago with general high output of late 1947 carrying over into 1948.

Nine of 20 materials included in the Commerce Dept. index showed higher January production than in December. These included cast iron radiation, cast iron soil pipe, and nails.

January output of radiation amounted to 5.4 million sq ft, slightly more than shipments. Production of soil pipe rose to 48,500 tons, leaving an order backlog of 287,200 tons. Shipment of 68,954

NEW SEN—A small section of the Osaka mint is still devoted to the production of coins. This girl is producing 50 sen pieces. The balance of the mint's facilities are being used for smelting for reparations.

tons of nails represents the highest output since last October.

On the other hand, lower output was recorded for fabricated structural steel, reinforcing bars, and rigid steel conduit and fittings. Structural steel shipments amounted to 130,000 tons against bookings of 155,000; January shipments of reinforcement bars totaled 20,882 tons.

Piston-Free Gas Engine Being Developed For Railroad Locomotives

Pittsburgh

. . . **A "free-piston"** gas turbine engine for a railroad locomotive and a new steam turbine-electric locomotive that it is hoped will reduce coal consumption by one half are among four new railroad engines under development by Westinghouse.

The third, reported Gwilym A. Price, president of Westinghouse Electric Corp. in an address before the New York Railroad Club, is a new and larger electric locomotive. The fourth, previously announced, is a gas turbine-electric locomotive designed to burn liquid fuel and operate in main line service.

Most novel departure in railroad propulsion is the "free-piston" gas turbine engine, but most significant to the nation's coal burning railroads, he added, is the steam turbine-electric drive.

This, he continued, is a major project undertaken jointly with the Babcock & Wilcox Co. to develop an improved type of steam turbine-electric locomotive utilizing an efficient, compact, high pressure, high temperature boiler.

"While this development is still in the early stages, it is hoped that a new locomotive will be produced to provide an improved, useful tool for the coal burning railroads," Mr. Price said.

The "free-piston" experimental development is being undertaken in collaboration with the Lima-Hamilton Corp., Hamilton, Ohio. Lima-Hamilton has been experimenting for some time with a new form of gas generator of the free-piston type designed to provide extremely high efficiency, he continued, and added:

"Their experience has been sufficiently encouraging for them to ask us to cooperate in the construction of a free-piston, gas turbine locomotive for trial service. For this, they will provide the gas generator that takes the place of the compressor and combustor in our unit. We will provide a 3000-hp gas turbine, the electric generators, motors and control."

NO FUEL PROBLEM: Fuel shortages pose no problem for Frank Krueger, Shawno, Wis. He heats his home by utilizing a reverse refrigeration process. Well water is pumped through a refrigeration unit which squeezes out the heat and raises its level before transferring it to a system of cylinders and coils, and finally out of the hot-air vents into the rooms.

Koppers Employees Tell What They Want; List A steady Job As No. 1

Pittsburgh

. . . **Koppers Co.** employees want job stability above anything from the company, according to a recently completed tabulation of 7100 questionnaires circulated by Koppers personnel department. After this they are interested in the size of their paychecks and a chance to get ahead.

C. T. Lile, personnel manager, said questionnaire results would have a definite bearing on policy, adding that a concerted effort had been made to get employees to express opinions. The questionnaires listed all the things normally considered important in management-employee relations and the worker was asked to number them in order of their importance to him.

"Sixty-two percent of the voting employees ranked a steady job, or stability, in the first five while 36 pct ranked it No. 1. Fifty-three percent ranked 'pay rate' among the five most important subjects, but only 7 pct signified their belief that it ranked above all other considerations. Forty-two percent placed 'a chance to get ahead' in the first five, and 7 pct thought it most important of all.

Mr. Lile also revealed the Koppers' employees attitudes on other subjects as follows:

Forty percent placed their desire for "a square boss" among the high five in importance. Only 5 pct made it their first choice.

Thirty-five percent ranked "working on the job you prefer" in the first five; 15 pct thought it of first importance.

Other subjects which employees listed much farther down the line in importance to them included "friendly working companions", "medical and health facilities", "vacations and holidays", etc.

Grand Coulee To Be Tops

Pittsburgh

. . . **Contracts recently** awarded to Westinghouse Electric Corp. by the Bureau of Reclamation for 3 additional 108,000-kw generators will make Grand Coulee Dam the world's largest producer of electricity at one location. When installed in 1950, these generators will bring Coulee's installed rated capacity to 1,620,000 kw, equivalent to 2,170,000 hp.

Westinghouse has built all the existing generators for Grand Coulee to date. The eighth unit recently went on the line and the ninth is scheduled to go into operation during May of this year. Westinghouse also holds contracts for building and installing the first 3 units for the east powerhouse, slated to go into service during 1949. With the addition of the 3 generators in 1950, there will be a total of 15 units installed in the two power houses. Only 3 more units are required to complete the present specifications for 18 units.

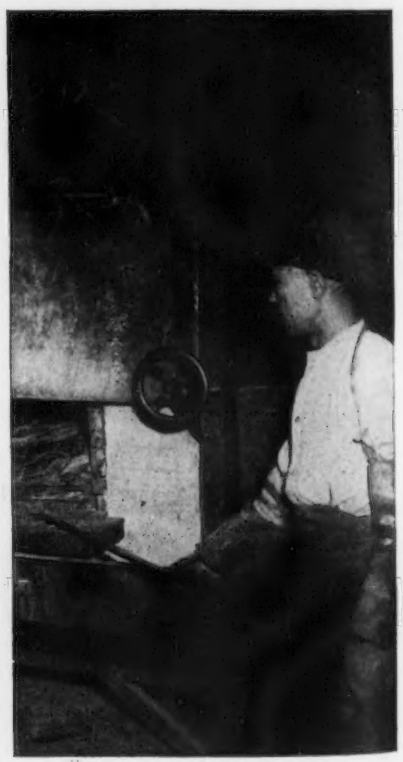
Study Coal-Gas Reaction

Pittsburgh

. . . **Gulf Oil Corp.** is using radioactive isotopes to study the chemical reaction by which gasoline is produced from coal. This reaction is still a mystery though engineers do know enough to commercially make gasoline from coal.

The coal-to-gasoline development is based on the Fischer-Tropsch process, originated and used in Germany during the war.

PREHEATING FOR COINS—A furnace preheating operation is carried on in the Osaka mint before new coins for the Japanese occupation are produced.



Minister of Supply Explains Importance Of British Exports

London

• • • What the export of a motor car means to the British people was told in terms of daily bread by Mr. G. R. Strauss, Minister of Supply, in a speech to Midland industrialists. It did not represent merely so many pounds sterling gained. A single average car sold abroad might bring enough meat for 25 families of four persons for a year or enough bread for 46 families for a year. And Britain might be reaching a position where the failure to export a car would mean the loss of an equivalent amount of meat or bread from the tables of the same number of families.

Mr. Strauss was explaining government policy as regards steel for motor car manufacture. He said that makers who could export and did so must have materials, which meant that those who did not export, could not have them. If that resulted in some firms having to close down, it was regrettable but unavoidable.

The Minister claimed that greatly exaggerated stories had appeared about the effect of the steel allocation on the motor industry. Contrary to statements which had been made by some managements to their workers, there had been no cut in steel allocations. There had, on the contrary, been an increase. It had not been a level increase to every firm, but there had been an increase to firms generally, and in some cases a substantial one. It had always been enough to cover the firm's quota of cars for home and export.

A number of firms had announced that they would be able to produce fewer cars in the coming year than last year, and were having to lay off some of their workers. Firms which were decreasing their output this year were doing so mostly for one of three reasons, or sometimes a combination of all three.

They might have decided to put in hand improvements in efficiency or concentration on new models. This might temporarily interrupt the flow of cars out of the factory, but it was a normal process of industry. Secondly, Mr. Strauss asserted, there were some firms who produced last year more cars than they could possibly have got from the steel allocated to them.

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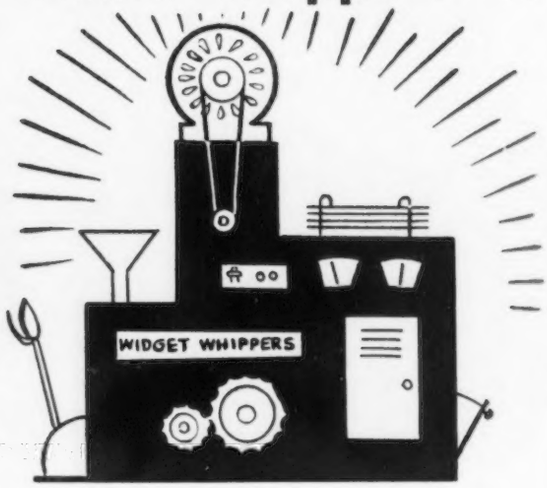

. . . or pots and pans, or trucks, or stoves, or any product fabricated of metal . . . you'll be interested in the story of Mr. Widget. He was faced with the dilemma of wanting to use resistance welding but not having sufficient plant transformer and distribution facilities to handle the extra load. Also the power people frowned on the addition of a *low power factor* load.

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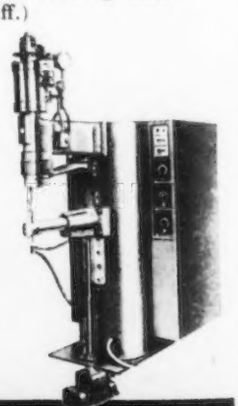

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